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Sri Chaitanya Saraswat Institute's

Fifth International Conference

SCIENCE AND SCIENTIST-2017

Working Together Toward a Spiritual Science of the Conscious Self

August 18 & 19, 2017

Nepal Pragya Pratisthan

Kamaladi, Kathmandu, Nepal

www.scsiscs.org/conference/scienceandscientist/2017

Prof. Madhav Prasad Lamichhane Collection, Kathmandu, Nepal

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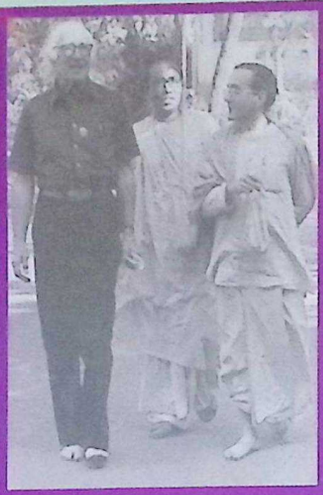
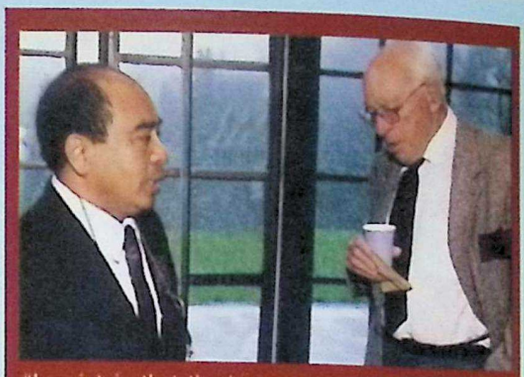
Srila A. C. Bhaktivedanta Swami Prabhupada pointing at his fingernail, explaining how it is made of matter, that it is manifesting because life is present in the body—**matter comes from life!**

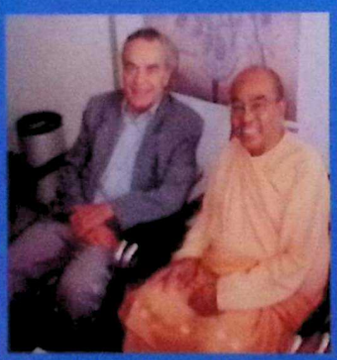


"The Bhaktivedanta Institute is greatly to be congratulated for having produced so crucial and productive a discussion. It should be given every encouragement and support in going ahead with an enterprise so well begun."
Prof. George Wald, Nobel Laureate



"I maintain that the human mystery is incredibly demeaned by reductionism, with its claim in promissory materialism to account eventually for all of the spiritual world in terms of patterns of neural activity. This belief must be classed as a superstition-...we are spiritual beings with souls in a spiritual world, as well as material beings with bodies and brains existing in a material world."

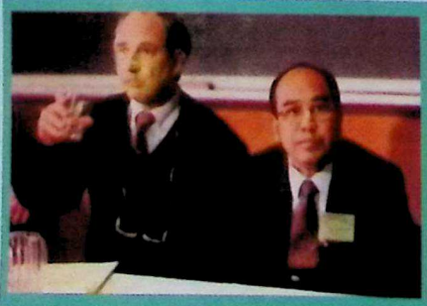
Sir John Eccles, Nobel Laureate



"I think that life could be beyond the assembly of biomolecules."
Prof. Werner Arber, Nobel Laureate

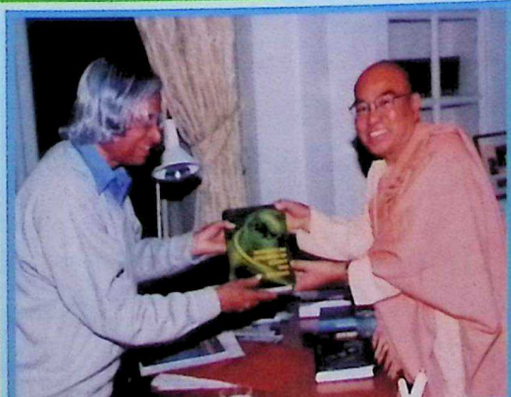
"Science and technology alone cannot solve the problems of the new millennium. We need additional guidelines for our actions, for the selection of our research projects and research goals. These guidelines have to do with ethics, with philosophy, and with faith."
Professor Richard R. Ernst, Nobel Laureate

"In India, there is much more union between the two (science and spirituality) than there is in the West. I think that the Western scientists are coming back to that point of view - what the universe is all about. A few scientists are interested and their number is increasing."
Prof. Charles Townes, Nobel Laureate



Srila Bhaktisvarupa Damodara Goswami Maharaja (Dr. T. D. Singh) with **Prof. John R. Searle**, American philosopher and currently the Slusser Professor of Philosophy at the University of California, Berkeley

Srila Sripad Maharaja (Dr. T. D. Singh) accepting a United Nations' Flag from **Dr. Robert Muller**, Former Assistant Secretary General of the United Nations



"Spirituality is the post graduate study of religion and we should rise from religion to spirituality."
Dr. A. P. J. Abdul Kalam, Former President of India

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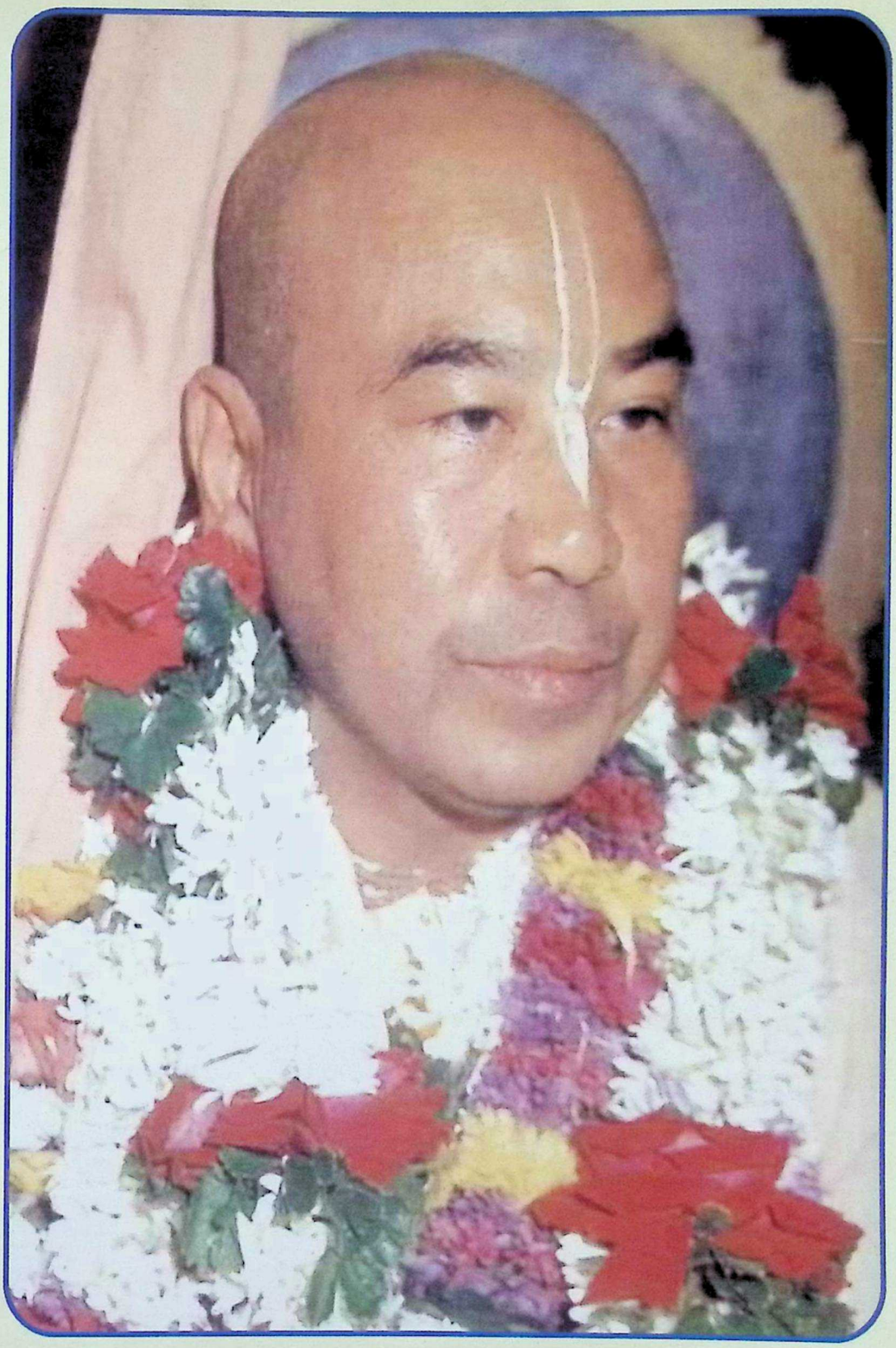

A humble offering to

Srila Bhaktisvarupa Damodara Goswami Maharaja

(Dr. T.D. Singh, Founding Director Bhaktivedanta Institute)

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Sripad Bhakti Madhava Puri Maharaja, Ph.D.

Visionary for 'Science and Scientist' Annual Conference Series

Srila Bhakti Madhava Puri Maharaja, Ph.D.
Serving Director, Bhakti Vedanta Institute,
Princeton, NJ, USA
Conference Chair
Science and Scientist – 2017

Sripad Bhakti Madhava Puri Maharaja, Ph.D. is a direct disciple of Srila A.C. Bhaktivedanta Swami Prabhupada and Srila Bhakti Rakshaka Sridhar Dev-Goswami Maharaja. In 1971 he was awarded a Ph.D. from a prominent university in USA. He is a leading Vedantic authority in all of the Gaudiya Vaishnava line of thought in the world today. Apart from that he is also a scholar in Hegelian Dialectics and is giving regular guidance to his students. Moreover, he has spent many years in Nabadwip, West Bengal, India, under the guidance of his Gurus in search of Vedantic conception of Absolute Truth. He has a profound grasp of both Vedanta and Western philosophy and due to his mood of humility and complete surrender he has received much appreciation from previous acharyas. Srila Sridhar Maharaja told to Srila Puri Maharaja, "I am just like you. My nature is just like yours," thus accepting his philosophical and devotional mood of service. Srila Bhakti Sundara Govinda Dev-Goswami Maharaja told to the servitors of scientific sankirtan movement that "Service to Puri Maharaja is service to me." Srila Bhaktisvarupa Damodar Goswami Maharaja (Srila Sripad Maharaja also known as Dr. T.D. Singh) appreciated Srila Puri Maharaja's humility and disinterest in worldly designations. He told him, "Your consciousness is very pure." Srila Bhakti Madhava Puri Maharaja, Ph.D. is a follower of Srila Prabhupada, the instructions of Srila Sridhar Maharaja and the direction of Srila Sripad. Srila Sripad Maharaja instructed a number of his disciples to follow and serve Srila Puri Maharaja and learn from his deep knowledge on Hegelian spiritual dialectic as well as Vedanta. Srila Puri Maharaja holds regular classes in Princeton as well as online Skype classes with his students all over the world. By the grace of previous Acharyas of Brahma-Madhva-Gaudiya Sampradaya Srila Puri Maharaja is highly empowered to guide the Scientific Sankirtan movement meant for establishing a lasting Harmony between Science and Religion.

Srila Sridhar Maharaja told to Srila Sripad Maharaja and Srila Puri Maharaja to build a temple over the tomb of Darwin. Srila Prabhupada has given two powerful transformative scientifically observed truths unrecognized by modern materialistic science, (1) Life comes from Life, and (2) Matter comes from Life. When Srila Puri Maharaja explained to the Nobel Biologist Professor George Wald, who was a very big atheistic evolutionist of his time, that why don't you consider that, "Matter comes from Life", he became convinced. After this Professor Wald wrote a series of articles denouncing his own earlier stance towards materialism in understanding life and instead talked about how life was prior to matter and is therefore its source. Srila Puri Maharaja is engaging the scientists to think about higher order concepts of Life and its utmost relevance for conceiving our true identity for more than four decades. He is the visionary behind the 'Science and Scientist' annual conference series and we are all eternally indebted to him for his love, affection and extraordinarily meritorious guidance.

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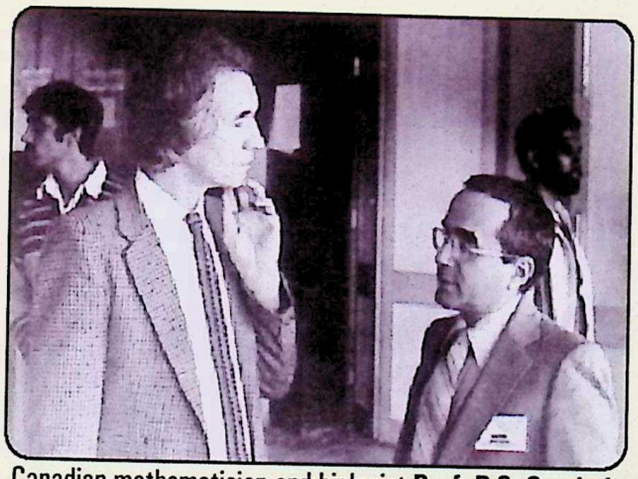
Nobel Biologist **Prof. George Wald** (*middle*) with Sripad Bhakti Madhava Puri Maharaja, Ph.D. (*right*) and Srila Bhaktisvarupa Damodara Goswami Maharaja, Ph.D. (*left*)

Nobel Biologist **Prof. George Wald** (*right*) interacting with Sripad Bhakti Madhava Puri Maharaja, Ph.D. (*left*)



Canadian mathematician and biologist **Prof. B.C. Goodwin** (*right*) from University of Sussex interacting with Sripad Bhakti Madhava Puri Maharaja, Ph.D. (*left*)

Sripad Bhakti Madhava Puri Maharaja, Ph.D. (*left*) interviewing **Dr. Rene Thomas** from Institut Des Hautes Etudes Scientifiques, France (*right*)

Dr. G. Malli, (*middle*) Prof. Emeritus, Dept. Chemistry, Simon Froser College, Canada discussing with Sripad Bhakti Madhava Puri Maharaja, Ph.D. (*right*)

Sripad Bhakti Madhava Puri Maharaja, Ph.D. (*right*) receiving instructions from his spiritual master, Srila A.C. Bhaktivedanta Swami Maharaja Prabhupada (*left*)

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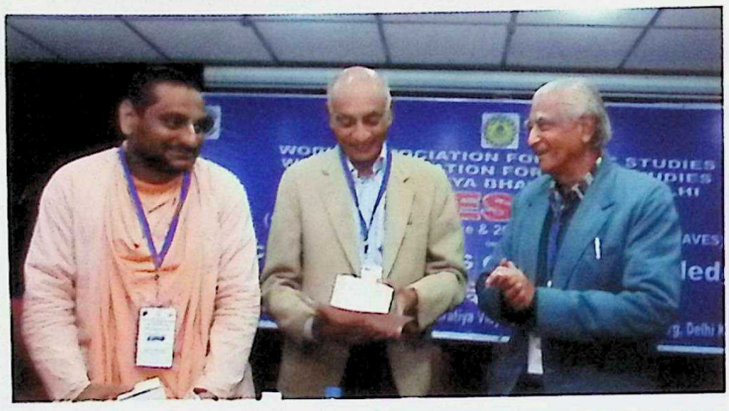
Scientific Sankirtan

Under the Guidance of Sripad Bhakti Madhava Puri Maharaja , Ph.D.



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Nepal Academy, Kamaladi, Kathmandu, Nepal
Nepal Academy of Science and Technology (NAST), Kathmandu, Nepal
Kathmandu University, Dhulikhel, Nepal
Central Department of Biotechnology, Tribhuvan University, Kathmandu, Nepal

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Sripad Bhakti Madhava Puri Maharaja, Ph.D., Serving Director, Bhakti Vedanta Institute of Spiritual Culture & Science – Princeton, NJ, USA

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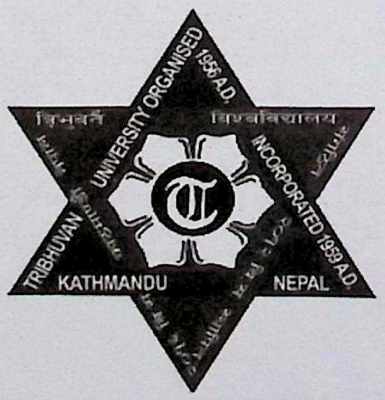

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(भारत सरकार, मानव संसाधन विकास मंत्रालय)
INDIAN COUNCIL OF PHILOSOPHICAL RESEARCH
(Government of India, Ministry of Human Resource Development)

प्रोफेसर एस० आर० भट्ट
अध्यक्ष
Professor S. R. Bhatt
Chairman

No.F.1-1/CM/2015/ICPR/
July 27, 2017

MESSAGE

I am happy that the Conference on "Science and Scientists, 2017" is taking place in Kathmandu, Nepal. The theme of the Conference is very much relevant to and needed in contemporary times. It is hoped that scientists and thinkers gathered there from all over the world will chart out a new path for symbiosis of science and spirituality which alone can ameliorate the present plight humanity is suffering from.

Both science and spirituality are boon to human kind and needed for human wellness. Their roles must be properly understood and appreciated. There is difference in nature, subject matter, goal, scope and methodologies between the two. But this difference is not to be viewed in discordance as they are complimentary in nature. They serve two different facets of human existence.

I hope scientists would realize that science is not value-neutral and must seek guidance from spirituality and spirituality has to be scientific. Let there be a happy symbiosis of the two

I wish well for the Conference.

S.R.Bhatt

S.R. Bhatt
Retired, Professor and Head
Department of Philosophy
Delhi University

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AN INSTITUTE OF NATIONAL IMPORTANCE

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Message

Scientific advancements have given us technology that is helping in psychiatric and mental health diagnosis and treatment. But it is oftentimes found that technology has somewhere also inadvertently contributed to more stress-related problems. Therefore there is a need for a strategy to think about a more optimized approach. For example we need to study the effect of the related electromagnetic radiation from mobile on the psyche and the body. When compared with the urban situation, the rural life style was more personal and relaxed. In this age of advanced science and technology, we can study the chemistry of the brain with the help of magnetic resonance spectroscopy. We can also measure the various neurotransmitter receptors and specific action of various drugs. We can study brain physiology as well as the functions of the brain on the rest of the body. Even a simple thing such as the heart rate has correlation with our mental state, such as whether we are relaxed or not. Similarly we can investigate the mechanisms of brain repair as well.

Medicine today has opened its door to all scientific specialties of the world. Mathematicians, engineers and a host of specialists like physicists and chemists have to combine together to approach the field of medical sciences. Even in NIMHANS there are several programs that interphase between philosophers and clinicians to evaluate the brain-mind and consciousness. There is a need to study the aspect of intelligence and thoughts as they are organically part of the brain functions. Today yoga is an integrated part of many psychiatric disorder treatments. There is a chemical called brain derived neurotropic factor. Its level increases if a person has done yoga for three months or longer. This trophic factor seems to help in protecting the individual from depression. Elderly persons in whom, hippocampus is supposed to shrink due to aging obtained a marginal increase in its size after a practice of yoga for six months. These are some of the leads that the application of yoga could have a protective effect. Yoga is also connected with meditation and thought control. Thus there is a great relation between the way we use our mind and our health. It is a fact that there can be no real health without mental health. These leads indicate that a holistic approach between mind and body requires a more systematic approach.

The Sri Chaitanya Saraswat Institute, Bangalore, India is organizing its fifth International Conference on Science and Scientist 2017 at Nepal Pragya Pratisthan, Kamaladi - Kathmandu, Nepal on 18-19th of August 2017. Modern science has found it difficult to explain the ontological nature of thinking. We need to explain and study the subjective aspect of reality as it has an inseparable effect on our health. I am very happy that the conference is focusing on these questions, which can harmonize the concepts from Science, Religion and philosophy for the betterment of all. I wish all success to this very important event.

Dr. BN Gangadhar

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NEPAL ACADEMY OF SCIENCE & TECHNOLOGY
OFFICE OF THE VICE-CHANCELLOR
NAST

August 2, 2017

MESSAGE

I am immensely delighted to know that a Conference on a very important theme entitled Science and Scientist is being held in Kathmandu. This is not the first time that such a Conference has been held in Nepal. I remember how several people had benefited from the Conference held in 2015 and I myself learned incredibly from the Conference.

The Fifth International conference Science and Scientist is raising a most important question, "Scientist can explain Science, but can Science explain the Scientist?" This is an essential question. All our equations have come from the thinking of scientists. Similarly the cultural aspect of design is also a humanistic ingredient. Yet we have no explanation for these formal aspects of cause that deals with intelligence, mind and thought. Oftentimes due to these reasons philosophers are being inducted as crucial partners in many scientific and medical applications. The subjective aspect of reality contributes to reality and science must include its study. I wish Science and Scientist 2017 all success and sincerely hope that science in 21st century will consider these aspects with a broader outlook.

Prof. Dr. Jiba Raj Pokharel
Vice Chancellor

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TRIBHUVAN UNIVERSITY

Kirtipur, Kathmandu, Nepal

OFFICE OF THE VICE CHANCELLOR

August 2, 2017

Message from the Vice Chancellor

I am very happy that several organizations of Nepal including the Central Department of Biotechnology, Tribhuvan University are together co-organizing Sri Chaitanya Saraswat Institute's Fifth International Conference Science and Scientist 2017. The theme of the conference covers a very important question about our spiritual conscious self. We are definitely conscious beings and we must study the nature of our self for a more complete understanding of reality.

The humble effort of the conference aims at harmonizing the distilled knowledge of modern science and technology with the spiritual wisdom of the world. In fact from the point of view of languages, it is noteworthy that the Science magazine on 1 July, 2005 had asked a list of important questions such as "Why are there critical periods for language learning? What are the evolutionary roots of language and music? and How much of personality is genetic?". The article described these as the most compelling puzzles and questions facing scientists today. In modern biology also it is increasingly being recognized that we have to approach life more as a cognitive phenomenon than merely a principle of action-reaction complex of chemicals and forces.

I wish the conference a grand success and a source of inspiration for keen minds so that we can aim for the higher aspirations of man that are concerned with spiritual progress, peace, harmony and prosperity for everyone. I look forward to the deliberations and hope that we can distill the essential conclusions from our ancient wisdom and modern scientific understanding for the benefit of all living beings and the universe.

T K Khaniya

Prof. Tirth Raj Khaniya (PhD)
Vice Chancellor

Tel.: 4330433/4330434, Fax: 977-1-4331964, E-mail: vcoffice@tribhuvan-university.edu.np, P.O.Box No. 8212

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Nepal Academy

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Message From Chancellor

I feel honored to express few wards for the souvenir which is being brought out on the occasion of the Fifth International Conference Science and Scientist -2017 to be held at Nepal Academy auditorium on August 17 and 18, 2017, organized by Sri Chaitanya Saraswat Institute Bangalore, India, in Collaboration with Sri Chaitanya Saraswat Sabha, Kathmandu, Nepal Academy, Nepal Academy for Science and Technology (NAST), Central Department of Biotechnology Tribhuwan University and Kathmandu University of Nepal. First of I would like to avail this opportunity to congratulate all the learned contributors, distinguished participants of this conference from National and International communities for their expected contribution to make this international conference success.

In fact, this International Conference on science and scientist is an appropriate forum for scholars and scientist of East and West to share their knowledge and experience and also to understand each other. Under the main theme of conference- Working Together Toward a Spiritual Science of Conscious Self, distinguished contributors would present their valuable views derived by their experiences and synthesized scientific knowledge with vedantic perspective. In that sense this intellectual forum will be able to search substantive meaning of life and universe integrating scientific views and vedantic perspective together contributing for the grand success of this conference.

South Asia, specially Nepal and India are the fountain of the spiritual knowledge. So culturally and academically our two countries are bound very firmly for long time. This forum having the participation of scholars from Nepal, India and the West, will create more congenial environment to help flourish our understanding and bilateral relationship. I wish this conference of grand success and all the best to our distinguished participants and guests while in Nepal.

Ganga Prasad Upreti
Chancellor
Nepal Academy

August 1, 2017

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Beyond the Modern Monolith of Consciousness

Sripad Bhakti Madhava Puri Maharaja, Ph. D.
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Part 1

Thinking does not necessarily imply a first person perspective. This is the presumptive perspective that Descartes and others bring to philosophy. It has led to the view of modernism including science that thinking is a purely subjective phenomenon of the finite spirit. However, there is no ontological necessity connecting thinking with the finite subject as Descartes merely presumed. He did not prove that.

Again, as previously explained, Aristotle did not presume that thinking was the activity of a finite subject. He conceived thinking as the pure self-activity of the Absolute, *noesis noeseous noesis*, thought thinking thought. The modern dogmatic presumption that a finite subjective thinker is needed for the activity of thinking is not the basis for the Platonic and Aristotelian philosophies, although that is missed by most modern interpreters of ancient philosophy because of the inherent finite subjective perspective that is characteristic of the modern period.

In order to rise above that perspective presumption to the absolute platform requires a completely revolutionary shift. As it is sometimes said of Plato, "Philosophy is learning to die." One has to transcend their present first person conception of the finite self as a starting point, and understand it is something to be arrived at or derived from the absolute perspective. This means that philosophy acknowledges that there is a First Person or absolute thinking that is not oneself. In the Vedic tradition this is called Adi Purusha. Religion understands this as God. Aristotle also called it *theos*.
The First proposition is that thinking can think itself, without need of a finite spirit. After all, we do not know how we think. What bodily part in the brain or otherwise produces thought? Does the sunset produce thought of the sunset? It seems strange to think that something like the sun setting below the horizon can cause thought. Nothing of the non-thought world of existence can cause thought. This has been called the hard problem of philosophy. This problem can be traced back to Descartes which will be briefly outlined in what follows.

Next we have to understand how pure thought or the absolute thinking that thinks itself, that has its own initiative within itself without the need of a finite subject? This difficult problem is addressed by Hegel in his Science of Logic. It involves the dialectical relation of concepts to their opposed conceptions. That is a subject in and of itself which I will not address here.

Hegel shows that starting from the most basic thought, Being, all the other categories or concepts such as the finite subjective thinker and consciousness or mind can be understood. Even if we start from Descartes cogito ergo sum, we can understand that his identity of thinking-being as the first principle divides itself into two sides: thinking and being, where thinking is abstracted from its identity with being and identified with consciousness [*res cogitans*] and being with the material world [*res extensus*], or content of that consciousness. This creates the hard problem mentioned before.

What this says is that the first principle thinking-being is not the object of consciousness but the source or origin of it. If we call thinking-being the self, then the self is before consciousness, so it can not be an object of consciousness.

It is the self as thinking-being that divides itself into a subjective consciousness opposed to an objective world. Kant realized the necessity of this self and called it the unity of apperception. It has a necessary existence before we can specify what we call consciousness. So ontologically, according to this scheme, thinking produces consciousness, not the other way around by those of the modern period who have been conditioned to conceive thinking in terms of a finite first person subjective perspective. While Kant did not properly understand the unity of apperception in the way explained here, Hegel did. For Hegel the self was self-consciousness. What this means and why it is referred to in this way requires understanding the self in a social context, an ontology which no other philosopher has articulated as clearly as Hegel, although it is referenced in the ideas of Kant and the Scottish philosophers of common sense.

Part 2

The right question is: which came first, consciousness or the thought/concept of consciousness?

As explained in **Part 1**, consciousness is a derived subordinate concept to the self-thinking Idea or Absolute.

Consciousness is a concept and concepts are formed by thinking. We could not refer to the word "consciousness" and what it means or represents unless we had first formulated the idea by thinking it. But what must be a surprising fact for the modern thinker, is that the idea of consciousness does not come from within us - solipsistic ally as it were. The idea of consciousness comes to us from experience of others who exhibit whom we theorize to have consciousness.

This is explained in a very simple but extraordinary way by three prominent child psychologists, Alison Gopnik, Andrew Meltzoff and Patricia Kuhl who argue that children are not simply passive vessels to be filled with knowledge, but act in a way that is similar to scientific investigators who make and test theories.

[Alison Gopnik, Andrew N. Meltzoff, and Patricia K. Kuhl, *The Scientist in the Crib: Minds, Brains and How Children Learn* (New York: William Morrow and Company, 1999).]

They explain that for a child -
"All that really reaches us from the outside world is a play of colours and shapes, light and sound. . . what we really see are bags of skin stuffed into pieces of cloth and draped over chairs. There are small restless black spots that move at the top of the bags of skin, and a hole underneath that irregularly makes noises. The bags move in

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unpredictable ways, and sometimes one of them will touch us. The holes change shape, and occasionally salty liquid pours from the two spots.

This is, of course, a madman's view of other people, a nightmare. The problem of Other Minds is how we somehow get from this mad view to our ordinary experience of people."

Perception only gives us bags of skin, and other minds are something more than bags of skin. To encounter other minds we need something more than perception. Gopnik argues that the something more is a theory. The infant is a theoretician who comprehends her world, and other minds appear in that world as the explanation of phenomena.

In other words, to understand other persons as having consciousness we need something more than perception. Gopnik explains that 'something more' as a theory. The infant must be a theoretician in order to make sense of its phenomenal experiences.

In this way we come to understand ourselves as having consciousness by recognizing that others consist of a consciousness that is aware of myself as having consciousness. This is how we come to understand that I must have a consciousness. In other words it is a socially constructed and shared concept. This explains why the word consciousness is derived from the Latin root con-scio, or knowing with others.

Reason is beyond consciousness

We misunderstand reason as being experienced within consciousness when it is reason [theory] that produces the idea of consciousness. Most of us generally accept that the Earth is rotating around its axis producing the phenomenon that we experience as day and night. The phenomenon of day and night is an experience within consciousness, but the spinning of the Earth is not. What consciousness experiences is the movement of the Sun across the sky from East to West. The rotation of the Earth is a product of reason, not consciousness. When the Sun disappears below the Western horizon in the evening and appears rising from the Eastern horizon in the morning, for consciousness it is just the disappearance and appearance of the Sun. For the ancients who experienced this, they thought the Sun dies and is born each day because that is what consciousness experiences. However, modern reason with its Copernican theory posits the Sun as a star that seems relatively stationary with respect to the rotating Earth. But that whole conception is for reason, not for consciousness.

The same is true for electrons, atoms and molecules. These objects are not objects of consciousness but products of reason whose observable properties are objects of consciousness but whose essence do not belong to phenomenal consciousness being noumenal products of reason.

The question arises: why do we think reason/reasoning is experienced within consciousness?

The answer lies in understanding the epistemological difference between the way we come to know things empirically (*ordo cognicendi*) and the logical or ontological order (*ordo essendi*) by which we come to know things. These two epistemological paths can be understood by comparing the way we empirically understand the construction of a book as printing alphabetical letters on papers that are bound together, compared to rationally understanding that a book is first composed in the mind of an author before it appears as an object of empirical consciousness.

Thus reason is experienced by consciousness before we logically realize that it is reason that ontologically produces what we call consciousness or a theory of consciousness. Those who think merely on the basis of empirical experience cannot realize the epistemological distinction between the empirical and rational comprehension of things.

Historical shift in the meaning of consciousness in the 16th - 17th Century

The English word "conscious" originally derived from the Latin conscious (*con-* "together" and *scio* "to know"), which meant "having joint or common knowledge with another".

[C. S. Lewis (1990). "Ch. 8: Conscience and conscious". *Studies in words*. Cambridge University Press. ISBN 978-0-521-39831-2.]

In the literal sense, "*conscientia*" means knowledge-with, that is, shared knowledge. The word first appears in Latin juridical texts by writers such as Cicero.

[G. Molenaar (1969). "Seneca's Use of the Term Conscientia". *Mnemosyne*. 22: 170–180. doi:10.1163/156852569x00670.]

Thomas Hobbes in *Leviathan* wrote: "Where two, or more men, know of one and the same fact, they are said to be Conscious of it one to another."

[Thomas Hobbes (1904). *Leviathan: or, The Matter, Forme & Power of a Commonwealth, Ecclesiasticall and Civill*. University Press. p. 39]

But then, especially during the seventeenth century, a shift occurred toward the more psychological meaning of consciousness we use today, as in the writings of Archbishop Ussher who in 1613 spoke of "being so conscious unto myself of my great weakness".

[James Ussher, Charles Richard Elrington (1613). *The whole works, Volume 2*. Hodges and Smith. p. 417.]

Locke's definition from 1690 illustrates this gradual shift in meaning had already taken place when he explains in his *Essay Concerning Human Understanding*,

"[A person] is a thinking intelligent Being, that has reason and reflection, and can consider it self as itself, the same thinking thing in different times and places; which it does only by that consciousness, which is inseparable from thinking, and as it seems to me essential to it: It being impossible for anyone to perceive, without perceiving, that he does perceive." (*Essay 2.27.9*)

René Descartes (1596–1650) is considered to be the first philosopher to use *conscientia* in a way that does not fit its original meaning. He used *conscientia* in the modern sense as - "conscience or internal testimony" (*conscientiâ, vel interno testimonio*).

[Boris Hennig (2007). "Cartesian Conscientia". *British Journal for the History of Philosophy*. 15: 455–484. doi:10.1080/09608780701444915.]

In his *Meditations on First Philosophy* (1641) Descartes defines thought in this way:

"Thought. I use this term to include everything that is within us in such a way that we are immediately aware [*conscii*] of it. Thus all the operations of the will, the intellect, the imagination and the senses are thoughts. I say 'immediately' so as to exclude the consequences of thoughts; a voluntary movement, for example, originates in a

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thought." (CSM II 113 / AT VII 160; cf. *Principles of Philosophy* Part I, §9 / AT VIIIA 7–8)

Thus Descartes defines thought as something "in us" of which we are conscious. This is the origin of subjective thought which is the modern concept that is uncritically accepted today without understanding its original meaning and significance in a more objective sense.

Leibniz was perhaps the first philosopher to make an attempt to formulate a theory of consciousness on the basis of representation. He writes:
"[I]t is good to distinguish between perception, which is the internal state of the monad [i.e., simple substance] representing external things, and apperception, which is consciousness, or the reflective knowledge of this internal state, something not given to all souls, nor at all times to a given soul. Moreover, it is because they lack this distinction that the Cartesians have failed, disregarding the perceptions that we do not apperceive, in the same way that people disregard imperceptible bodies. This is also what leads the same Cartesians to believe that only minds are monads, that there are no souls in beasts, still less other principles of life." ("*Principles of Nature and Grace*" §4, AG 208)

It is, of course, this 'apperception' that Kant takes as a key necessity for comprehending the possibility of knowledge of objects. While Leibniz pointed out the failings of the Cartesian view, Kant tried to correct those of Leibniz. Hegel developed his system of philosophy by showing how the various philosophies of history display abstract or specific moments of the science of philosophy as a whole.

Another important point that is regularly overlooked by the megalithic consciousness camp is the difference between the self, ego or self-consciousness and consciousness. In the 1989 version of the *Macmillan Dictionary of Psychology* it is explained:

"Many fall into the trap of equating consciousness with self-consciousness—to be conscious it is only necessary to be aware of the external world."
There is no consciousness without a unifying Self or self=consciousness. The individual self does exist but not as an isolated solipsistic individual. The individual is rather the moment of individuality conceived in the totality of its relation to the universal and particular moments of the self-thinking or self-developing Idea or Absolute. This may be understood in its moral or ethical nature as the Good, or as Love in Religion, Beauty in Art, and Truth in Philosophy.

A Gaudiya Vaisnava Appeal to The Scientific Community

Srila Bhakti Nirmal Acharya Maharaja
Serving President Acharya, Sri Chaitanya Saraswat Math

Gaudiya Vaisnavas seek absolute knowledge[1]: knowledge that is comprehensive[2], beyond refutation[3], and wholly fulfilling to those who acquire it[4]. To this end, Gaudiya Vaisnavas accept three fundamental pramanas, that is, means by which such knowledge can be acquired[5]:

- Pratyaksa: sense perception, lit. that which is present before (prati) the senses (aksa)[6].
- Anuman: inference, conclusions drawn from given premises, lit. that which is known (man) after (anu)[7].
- Sabda: verbal testimony, lit. sound, speech[8].
- Sabda is regarded as the foremost of the accepted pramanas: as a king governs his ministers and bears their trust, so sabda is the guide of pratyaksa and anuman and is trusted by them in the pursuit of absolute knowledge[9]. This is because pratyaksa and anuman are considered unreliable and insufficient in and of themselves. The defects of pratyaksa include[10]:
- The imperfections of human perception:
  - Bhrama: the potential for misunderstanding; mistaking one thing for another, such as a rope for a snake.
  - Pramad: the possibility of inattention; failing to acknowledge something that could have been perceived.
  - Vipralipsa: deceit; prejudice; not perceiving something clearly or misrepresenting something that has been perceived.
  - Karanapatava: sensory deficiency; being unable to accurately perceive something at a long or short distance or on a large or small scale.
- A shallowness of scope:
  - Pratyaksa necessitates for its authority that the whole of the absolute be made up of a fabric perceptible to human senses.

Anuman is also considered defective because:

- Its means to discover something unperceived (beyond pratyaksa) is based entirely upon previous perceptions (pratyaksa itself) and thus is not free from the same defects as pratyaksa[11].
- It necessitates for its authority that the whole of the absolute function according to rational principles that are intelligible to humans minds.

Because the instruments of pratyaksa and anuman—the body, senses, mind, and intellect—are all made up of gross and subtle forms of matter[12], they can provide knowledge only of matter[13]. To acquire knowledge of the absolute reality which pervades and encompasses material existence, an additional pramana is necessary.
Sabda is classified in two categories[14]:

- Pauruseya-sabda: human testimony.
- Apauruseya-sabda: non-human testimony; testimony of supernatural origin that is communicated via its own agency through a human being, a sacred text, or directly into the consciousness; simply, divine revelation[15].

Pauruseya-sabda is subject to all the above defects[16]. Apauruseya-sabda, although it in many cases makes use of pratyaksa and anuman as a means

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of transmission, is itself beyond all the above defects[17] and thus is the only possible means by which absolute knowledge can be acquired[18].

Apauruseya-sabda is also known as adhoksaja-jnan, which has been defined as "knowledge which supersedes the knowledge produced by the senses (pratyaksa)"[19]. Because apauruseya-sabda originates from beyond the scope of pratyaksa and anuman and has agency that surpasses theirs, pratyaksa and anuman have no means to confirm or deny its existence or the knowledge it leads to[20]. The only way to verify that anything purported to be apauruseya-sabda is actually such is to follow whatever it prescribes to realize its import[21]. Thus, in Gaudiya Vaisnava practice enquiry into the unknown[22] is a complete engagement of all one's faculties within a system of theory and practice[23] in which results can be assessed according to a standard of measurement[24]. Just as according to the scientific method hypotheses and theories come to be regarded as valid through the process of experiment, observation, and repetition, so the authenticity of apauruseya-sabda has its means of verification through application of the process it prescribes.

Science is generally understood as a method of enquiry that exercises pratyaksa and anuman exclusively. How its practitioners—scientists themselves—have viewed or integrated apauruseya-sabda or things purported to be such within their research has varied greatly over time and circumstances. In European, Middle Eastern, and Indian traditions over the centuries, scientists who are honored within the scientific community today for their contributions to scientific discovery are known to have been active adherents of the apauruseya-sabda revered within Christian, Islamic, Hindu, and other traditions while engaged in their scientific research. It only is relatively recently that the fallacy that scientific research can falsify all knowledge acquired through apauruseya-sabda[25] has won popular appeal in society and amongst scientists.

Gaudiya Vaisnavas admire the natural world as a wonderful creation maintained by the sweet will of the all-loving, all-conscious Supreme Person Sri Krishna[26]. They aspire to live lives of devout service to Lord Sri Krishna[27] and express their love for Him by honoring everything throughout the natural world as His property and the paraphernalia for His service[28]. They consider admiration for the creator of the natural world and the desire to receive revelation about Him (apauruseya-sabda) to be ultimate success of unprejudiced study of the natural world by means of pratyaksa and anuman[29].

Whether or not a majority of scientists are reaching this conclusion at present or not, I wish to appeal to them to restrain any and all forms of prejudice concerning apauruseya-sabda[30] and consider it to be at the very least a source of guidance in the development of empiric science, the utility of which is conceived by Gaudiya Vaisnava according to the principle of yukta-vairagya[31], applied here to mean utilization of developments in science and technology to facilitate and express devotional service to the Lord. As scientific discovery is driven by hypothesis and new experiments based on fresh perspectives and postulation, so referring to apauruseya-sabda as a source of guidance in forming hypotheses and theories may well prove to be a source of many invaluable discoveries. To this end, I appeal to the scientists in the academic community today to strive:

- Not to confound the scope of scientific enquiry with the scope of potential human experience or reality.
  - Not to profess that pratyaksa and anuman are the only means of acquiring meaningful knowledge.
  - Not to claim that absolute (irrefutable, comprehensive) knowledge can be acquired through pratyaksa and anuman alone.
  - Not to claim the nonexistence of the soul, divinity, the Supreme Being, and other entities defined as being unknowable by means pratyaksa and anuman.
  - To admire the natural world but consider it only the beginning of potential for fulfilling experience rather than the sum total of it.
  - Not to promote exclusive preoccupation with the objective world.
  - Not to belittle the value of meaningful and fulfilling subjective experience.
  - Not to promote the glamour of technologically enhanced lifestyles within the plane of mortality over and above enquiry into higher planes of eternal, harmonious, and joyful life.
  - Not to assume that the extraction and manipulation of natural resources for exploitative purposes can occur without negative reactions of equivalent measure.

- To develop models for scientific research with respect to declarations regarding the natural world given by apauruseya-sabda sources;

For example:

  - To consider that life comes from life: life is a fundamental energy within the natural world that is distinct from and yet pervades and animates matter (it is a product of matter).
  - To consider that matter comes from life: matter is a phenomenon produced by an imperceptible, nonmaterial source.
  - To consider the animate conglomerate of matter and life perceivable through pratyaksa and anuman to be only a superficial layer within a far more vast multi-layered absolute reality.
  - To consider the laws observed within the natural world to be indications of a conscious, personal overseer (God) who guides the ongoing existence of the material universe.

- To apply scientific research and development towards ends that will facilitate adherence to life-paths given by apauruseya-sabda.
  - Consider science a means to practically assist human beings in their pursuit of individual and collective fulfillment found through knowledge of absolute reality.

Footnotes

1: Vedanta-sutra: 1.1.1; Srimad Bhagavad-gita: 7.2.
2: Vedanta-sutra: 1.1.2.
3: Vedanta-sutra: 2.1.11.
4: Vedanta-sutra: 1.1.12.

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5: Prameya-ratnavali: 9.1.
6: Sri Tattva-sandarbha-tika: 9.
7: Sri Tattva-sandarbha-tika: 9.
8: Sri Tattva-sandarbha-tika: 9.
9: Sarva-samvadini: 9–10.
10: Sri Chaitanya-charitamrta: Adi-lila, 2.86; Sarva-samvadini: 9; Sri Tattva-sandarbha-tika: 9.
11: Sri Tattva-sandarbha-tika: 9.
12: Srimad Bhagavad-gita: 7.4, 13.6.
13: Sri Tattva-sandarbha: 9; Sri Tattva-sandarbha-tika: 10.
14: Sarva-samvadini: 9–10.
15: Sarva-samvadini: 11.
16: Sarva-samvadini: 9.
17: Sarva-samvadini: 10; Sri Chaitanya-charitamrta: Adi-lila, 2.86, 6.107.
18: Sri Tattva-sandarbha: 10; Vedanta-sutra: 1.1.3.
19: *adhaḥ-kṛtam atikrāntam akṣajam indriyajam jñānaṁ yena saḥ adhokṣaja* (Srila Visvanath Chakravarti Thakur).
20: Sarva-samvadini: 10.
21: Srimad Bhagavad-gita: 4.34.
22: Vedanta-sutra: 1.1.1.
23: Sri Bhakti-rasamrta-sindhu: Purva-vibhaga, 1.11, 1.18, 2.1.
24: Srimad Bhagavatam: 11.2.42.
25: Mahabharata: Bhisma-parva, 5.22.
26: Srimad Bhagavad-gita: 9.10, 10.42.
27: Sri Bhakti-rasamrta-sindhu: Purva-vibhaga, 1.11.
28: Srimad Bhagavatam: 11.6.46; Sri Bhakti-rasamrta-sindhu: Purva-vibhaga, 2.255.
29: 21: Srimad Bhagavad-gita: 7.19. "I expect that gradually, by the mercy of Nityananda Prabhu and Sri Chaitanya Mahaprabhu, the atheistic age will come to an end, and most scientists will become theistic and get Krishna consciousness. I do not think everything will go into the line of atheism" (Srila Bhakti Sundar Govinda Dev-Goswami Maharaj).
30: Srimad Bhagavad-gita: 7.15.
31: Sri Bhakti-rasamrta-sindhu: Purva-vibhaga, 2.255.

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PROGRAM OF FIFTH INTERNATIONAL CONFERENCE
SCIENCE AND SCIENTIST – 2017

18th August 2017 (FRIDAY)

07.30 – 08.30	**Registration** **Setting up Posters & Banners**
08.30 – 9.00	**Mahaprasadam: Snacks & Herbal Tea Break**
09.00 – 9.05	**Invocation**
09.05 – 9.10	**Welcome Address & Conference Vision by Sripad Bhakti Madhava Puri Maharaja, Ph.D.** (*Conference Chair and Serving Director, Bhakti Vedanta Institute of Spiritual Culture & Science – Princeton, NJ, USA*)**: Bhakti Vijnana Muni, Ph.D.,** *President, Sri Chaitanya Saraswat Institute, Bengaluru, India*
09.10 – 09.15	**Inauguration by Lighting the Lamp & Inauguration of Conference Proceeding**
09.15 – 09.20	**Inaugural Address: S.R. Bhatt, Ph.D.,** *Chairman, Indian Council of Philosophical Research (ICPR), New Delhi, India*
09.20 – 09.25	**Bhakti Niskama Shanta, Ph.D.,** *Gen. Secretary, Sri Chaitanya Saraswat Institute, Bengaluru, India*
09.25 – 09.30	**Joan Walton, Ph.D.,** *Primary Ph.D. Supervisor, Department of Education Studies, Faculty of Education, Liverpool Hope University, UK*
09.30 – 09.35	**Mohan Kharel, Ph.D.,** *Retd. Prof. ,Central Dept. of Biotechnology, Tribhuvan University, Nepal*
09.35 – 09.40	**A. K. Mukhopadhyay, M.D.,** *Professor & Head, Laboratory Medicine, All India Institute of Medical Sciences, New Delhi, India*
09.40 – 09.45	**Sri Ganga Prasad Uprety,** *Chancellor, Nepal Academy, Kamaladi, Kathmandu, Nepal*
09.45 – 09.50	**Jiba Raj Pokharel, Ph.D.,** *Vice Chancellor, Nepal Academy of Science and Technology (NAST), Kathmandu, Nepal*
09.50 – 09.55	**Suresh Raj Sharma, Ph.D.,** *Founder Vice-Chancellor, Kathmandu University, Nepal*
09.55 – 10.00	**Tirth Raj Khaniya, Ph.D.,** *Vice Chancellor, Tribhuvan University, Nepal*
10.00 – 10.10	**Address by Guest of Honour: His Excellency Sri Manjeev Singh Puri,** *Ambassador of India to Nepal*
10.10 – 10.30	**Presidential Address:** His Excellency Dr. Ram Baran Yadav, Honorable Former President of Nepal.
10.30 – 10.45	**Mahaprasadam: Herbal Tea Break**
10.45	**Plenary Session to Introduce the Theme of 'Science and Scientist – 2017'** **Chairpersons: M.V. Jagannadham, Ph.D.,** *Sr. Principal Scientist, Centre for Cellular and Molecular Biology, Hyderabad, India* & **A. K. Mukhopadhyay, M.D.,** *Professor & Head, Laboratory Medicine, All India Institute of Medical Sciences, New Delhi, India*
10.45 – 11.25	**Plenary Talk 1:** Dissecting the Central Dogma of Subject–Object Dichotomy in the Modern Science **Bhakti Niskama Shanta, Ph.D.,** *Gen. Secretary, Sri Chaitanya Saraswat Institute of*

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	Spiritual Culture and Science, Bengaluru, India
11.25 – 12.05	**Plenary Talk 2:** Harmony of Science and Vedanta **Bhakti Vijnana Muni, Ph.D.,** *President, Sri Chaitanya Saraswat Institute of Spiritual Culture and Science, Bengaluru, India*
12.05 – 12.45	**Plenary Talk 3:** Cartesian Mind–Body Dualism and Vedantic Response **S.R. Bhatt, Ph.D.,** *Chairman, Indian Council of Philosophical Research (ICPR), New Delhi, India*
12.45 – 13.15	**Plenary Talk 4:** Action Research: A Methodology for Inquiring into Subjective Experience **Joan Walton, Ph.D.,** *Primary Ph.D. Supervisor, Department of Education Studies, Faculty of Education, Liverpool Hope University, UK*
13.15 – 14.00	**Mahaprasadam: Lunch**
14.00	**Session: Scientific Critique of Life Science** **Chairpersons:** **S.R. Bhatt, Ph.D.,** *Chairman, Indian Council of Philosophical Research(ICPR), New Delhi, India* & **Bhakti Niskama Shanta, Ph.D.,** *Gen. Secretary, Sri Chaitanya Saraswat Institute of Spiritual Culture and Science, Bengaluru, India*
14.00 – 14.30	**Talk 1:** Origin of life on Earth: Comparison of Opinions form Modern Science and Vedantic Views **M.V. Jagannadham, Ph.D.,** *Sr. Principal Scientist, Centre for Cellular and Molecular Biology, Hyderabad, India*
14.30 – 15.00	**Talk 2:** Restoration of Brain Functions by Rewiring and Remodeling of Neural Circuits **B. S. Shankaranarayana Rao, Ph.D.,** *Professor, Department of Neurophysiology, National Institute of Mental Health and Neurosciences, Bengaluru, India*
15.00 – 15.30	**Talk 3:** Soft Logic for Consciousness Science **Moshe Klein & Oded Maimon, Ph.D.** *Department of Industrial Engineering, Tel Aviv University, Israel*
15.30 – 16.00	**Talk 4:** Joining the Dots: The Ladder of Cognition **A. K. Mukhopadhyay, M.D.,** *Professor & Head, Laboratory Medicine, All India Institute of Medical Sciences, New Delhi, India*
16.00 – 16.30	**Mahaprasadam: Snacks & Herbal Tea Break** **Poster Session**

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16.30	**Session: Science of Spiritual Biology** **Chairpersons:** **Jiba Raj Pokharel, Ph.D.,** *Vice Chancellor, Nepal Academy of Science and Technology (NAST), Kathmandu, Nepal* & **Bhakti Vijnana Muni, Ph.D.,** *President, Sri Chaitanya Saraswat Institute of Spiritual Culture and Science, Bengaluru, India*
16.30 – 17.00	**Talk 1:** Quantum theory, Determinism and the Question of Free Will **Sisir Kumar Roy, Ph.D.,** *Visiting Chair Professor, National Institute of Advanced Studies, IISc Campus, Bengaluru, India*
17.00 – 17.30	**Talk 2:** The Karmic Role for the Dynamism in Nature or So – Called Evolution **Mohan Kharel, Ph.D.,** *Retd. Prof. ,Central Dept. of Biotechnology, Tribhuvan University, Nepal*
17.30 – 18.00	**Talk 3:** Bacterial Intelligence and Sentience **Rajani Malla, Ph.D.,** *Professor, Central Department of Biotechnology, Tribhuvan University, Kathmandu, Nepal*
18.30 – 19.00	**Talk 4:** Concept of Body and Mind in Vedic Philosophies **Govinda S. Upadhyaya, Ph.D.,** *Department of Philosophy and Psychology, TU Trichandra Multiple Campus, Nepal*
19.00 – 19.30	**Talk 5:** Near Death Experience – what we know, what we don't know **Garga Chatterjee, Ph.D.,** *Assistant Professor, Indian Statistical Institute, Kolkata, India*
19.30 –20.00	**Cultural Program**
20.00 –20.45	**Mahaprasadam: Dinner**

19th August 2017 (Saturday)

08.30 – 09.00	**Mahaprasadam: Snacks & Herbal Tea Break**
09.00	**Session: Exploring the Mysteries of Life** **Chairpersons:** **Joan Walton, Ph.D.,** *Primary Ph.D. Supervisor, Department of Education Studies, Faculty of Education, Liverpool Hope University, UK* & **B. S. Shankaranarayana Rao, Ph.D.,** *Professor, Department of National Institute of Mental Health and Neurosciences, Bengaluru, India*
09.00 – 09.30	**Talk 1:** Unification of Objective Realism and Spiritual Development **Paul J. Werbos, Ph.D.,** *Co-director of Center of Large-Scale Integrated Optimization Networks CLION at FedEx Institute of Technology, IntControl, Harvard University,*

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	Washington D.C., USA
09.30 – 10.00	**Talk 2:** The Shillongator Model of the Universe Revisited After 30 Years **Sungchul Ji, Ph.D.,** *Associate Professor, Dept. Pharmacology & Toxicology, Ernest Mario School of Pharmacy of Rutgers University, NJ, USA*
10.30 – 11.00	**Talk 3:** Life Comes from Life and Matter Comes from Life – Consistency with Modern Science **Smt. Syamala Murthy Hari,** *Retired Distinguished Member of Technical Staff, Lucent, Technologies, USA*
11.00 – 11.30	**Talk 4:** Thermodynamics Challenges to the Materialistic View of Origin of the Biological System–a Review **Shilpi Saxena (Sumnagala Devi Dasi), Ph.D.,** *Scientist, Center for Advanced Studies, Department of Geology, University of Delhi, India*
11.30 – 12.00	**Talk 5:** Origin of Heart Beat a Microcosm of Origin of Universe: Syncretism between Vedic and Kabbalah, Christian, Islamic Philosophies and Quantum Physics **Sundeep Mishra, M.D.,** *Prof. of Cardiology, All India Institute of Medical Sciences, New Delhi, India*
12.00 – 12.30	**Talk 6:** The Game of Life – Purpose and Principles **L. S. Ganesh, Ph.D.,** *Prof. at the Dept. Management Studies, Indian Institute of Technology (IIT) Madras, India*
12.30 – 12.45	**Mahaprasadam: Herbal Tea Break**
12.45	**Parallel Session: Reflections on Vedānta and Science** **Chairpersons (Hall 1):** **Mohan Kharel, Ph.D.,** *Retd. Prof., Central Dept. of Biotechnology, Tribhuvan University, Nepal* & **Mrigendra Bahadur Karki, Ph.D.,** *Executive Director CNAS, Tribhuvan University, Nepal* **Chairpersons (Hall 2):** **Rajani Malla, Ph.D.,** *Central Dept. of Biotechnology, Tribhuvan University, Nepal* & **Rameshwar Adhikari, Ph.D.,** *Executive Director, Research Centre for Applied Science and Technology (RECAST), Tribhuvan University, Nepal*
12.45 – 13.00	**Talk 1:** The Objects of Perception In Illusory Experiences (Hall 1) **Alphy Greever,** *Research Scholar, Department of Philosophy, Delhi University, New Delhi, India* The Modern "Self" (Hall 2) **Lokesh Pant,** *Research Scholar, Dept. Philosophy, University of Delhi, New Delhi, India*

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13.00– 13.15	**Talk 2:** Theory of Procreation in Vedic Literature: A Quantum Field Theoretic Model (Hall 1) **Radhey Shyam Kaushal, Ph.D.**, *Formerly UGC Research Professor, Department of Physics & Astrophysics, University of Delhi, India* Understanding the Dynamics of Human Cognitive Processing System by Studying Hand Movement: A new possibility in kinematics (Hall 2) **Lekhnath Sharma Pathak,** *Assistant Professor in the Central Department of Linguistics, Tribhuvan University, Nepal*
13.15– 13.30	**Talk 3:** The 'Unseen' Body; Biofield Scanning for Detection and Prediction of Health Issues (Hall 1) **Nandini Bondale, Ph.D.**, *STCS, Tata Institute of Fundamental Research, Mumbai, India &* **Anup Deo, Ph.D.**, *Founder and CEO, Institute for Biofield Evaluation and Research Center, Thane, India* The Spiritual Properties of Plants for Activating Higher Consciousness (Hall 2) **Khaga Raj Sharma, Ph.D.,** *Research Scholar, Central Department of Chemistry, TU, Nepal*
13.30 – 14.30	**Lunch**
14.30	**Parallel Session: Views of Vedānta and Science on Consciousness** **Chairpersons (Hall 1):** **Sisir Kumar Roy, Ph.D.,** *Visiting Chair Professor, National Institute of Advanced Studies, IISc Campus, Bengaluru, India* & **Garga Chatterjee, Ph.D.,** *Assistant Professor, Indian Statistical Institute, Kolkata, India* **Chairpersons (Hall 2):** **Krishna Das Manandhar, Ph.D., Head,** *Central Dept. of Biotechnology, Tribhuvan University, Nepal* & **Deba Prasad Dash, M.D.(Ay.),** *Head, Dept. Panchakarma, Gopabandhu, Ayurveda Mahavidyalaya, Puri, India*
14.30 – 14.45	**Talk 1:** Life and World in the eyes of *Advaita Vedanta* (Hall 1) **Guru Prasad Suvedi, Ph.D.**, *Saha Pradhyapak, Nepal Sanskrit Vishwavidyalaya Pracharya – Mahesh Sanskrit Gurukul Vidyapith, Nepal* Conscious as the Centre of Well Being! (Hall 2) **Ram Deo Pandit,** *Central Dept. Sanskrit, Tribhuvan University, Nepal*
14.45 – 15.00	**Talk 2:** Srimad Bhagavat Purana as a Source of Research Questions and Model Building (Hall 1) **Damodar Jnawali, Ph.D.**, *Department of Geography Education, Tribhuvan University, Kathmandu, Nepal* Sprit and Science (Hall 2) **Bhagawan Das Manandhar, Ph.D.,** *Professor, Rampur Campus, Institute of Agriculture and Animal Science, TU, Nepal*

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15.00 – 15.15	**Talk 3:** Control Of Mind – An Ayurvedic Approach (Hall 1) **Deba Prasad Dash, M.D.(Ay.),** *Head, Dept. Panchakarma, Gopabandhu, Ayurveda Mahavidyalaya, Puri, India &* **Sushanta Sahu, M.D.(Ay.),** *Asst. Professor, Dept. Of Roga Nidan & Vikriti Vigyan (Pathology), S.S.N. Ayurved College & Research Institute, Paikmal, Odisha, India* Consciousness Studies And Quantum Mechanics (Hall 2) **Varanasi Ramabrahmam, Ph.D.,** *Associate Prof. Department of Physics, K.M Center for P.G. Studies Pondicherry (Retired), India*
15.15 – 15.30	**Talk 4:** Spiritual Essence of Evolution (Hall 1) **Siddhartha Sahu, M.D.,** *Assistant Professor of Orthopaedic Surgery, KIIT University & PBM Hospital, Kalinga Institute of Medical Sciences, Bhubaneshwar, Odisha, India* Complex Systems Approach to the Hard Problem of Consciousness (Hall 2) **Sahana V. Rajan,** *Research Scholar, PhD Research Scholar at Delhi University, Delhi, India*
15.30 – 15.45	**Talk 5:** Understanding Modern Science Through Vedantic Philosophy (Hall 1) **S.C. Vetrivel, Ph.D. & M Mohanasundari, Ph.D.,** *Assistant Professor, Department of Management Studies, Kongu Engineering college Country India* Plant Sentience in Relation to Spiritually Positive Stimuli (Hall 2) **H.H. Jayant Balaji Athavale, Ph.D.,** *Founder - Maharshi Adhyatma Vishwavidyalay, Goa, India*
15.45 – 16.00	**Talk 6:** Plant science in Atharvaveda: A study (Hall 1) **Tahasin Mondal,** *Research Scholar, Department of Sanskrit, Aligarh Muslim University, India* Science and Scientist : Mind, Body Consciousness – Way beyond scientific methodology (Hall 2) **Anuja Chouhan, Ph.D.,** *Professor & Dean, Arni School of Basic Sciences, Arni University,Kangra, H.P., India*
16.00 – 16.15	**Talk 7:** Rasayana: An Ayurveda Approach For Longevity (Hall 1) **Jyotiranjan Meher and Arunima Meher,** *Dept. Panchakarma, Gopabandhu, Ayurveda Mahavidyalaya, Puri, India* Uncertainty: Physiological Approach Towards The Issue of Existence of Creator (Hall 2) **Susrut Ghimire,** *DAV College, Lalitpur, Nepal*
16.15 – 16.30	**Talk 8:** Consciousness as a Problem of the Psychological Science (Hall 1) **Valentin Ageyev,** *Professor, Dept. Psychology, Kazakh National University, Almaty, Almaty, Kazakhstan* Quantum Science, Evolution, Biofield and Consciousness–A Perspective (Hall 2) **S. Rammohan,** *I.R.A.S,(retd.), Formerly Spl. Secy to Govt. of India*

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16.30– 16.45	**Talk 9:** Health Benefits of Vegetarian and Vegan Diet including Spirituality (Hall 1) **Ram Chandra Basnyat, Ph.D.**, *Professor, Central Department of Chemistry, TU, Nepal* Study of consciousness in the light of Vedanta (Hall 2) **Ananda Raj Poudel,** *Teaching Assistant, Dept. Swastha Vritta (yoga and lifestyle management), Institute of Medicine, Ayurrveda Campus, Tribhuvan University , Nepal*
16.45 – 17.00	**Talk 10:** Science, Mankind, Religion and Global Peace (Hall 1) **Nandanandan Das, Ph.D.**, *Former E.I.C cum Secretary, Works, Govt. of Odisha, Odisha, India* Hinduism: science and spirituality (Hall 2) **Padam Prasad Pande**, *M. Phil., Retired Teacher, Kathmandu, Nepal*
17.00 – 17.15	**Talk 11:** Concept of Body and Mind in Vedic Philosophies (Hall 1) **Govinda S. Upadhyaya, Ph.D.,** *Professor, Department of Philosophy and Psychology, TU Trichandra Multiple Campus, Nepal* Psychology Behind the Origin of Man and Woman in Indian Thought (Hall 2) **V.K. Hampiholi, Ph.D.**, *Emeritus Fellow (UGC) Retired Principal, Dr. A.V. Baliga College of Arts and Science. KUMTA: 581343 (NK) Karnatak, India*
17.15 – 17.30	**Talk 12:** The Psycho-spiritual Cognizance in the Sacred Vedic Art, Architecture and Iconographic symbols (Hall 1) **Bharat Giri,** *Independent Research Scholar, Spiritual Artist, Nepal* Towards Synthesis of Science, Philosophy and Spirituality – (*Glimpses from Dr. T.D. Singh's contribution*) (Hall 2) **Jayanti Ranganathan Chavan, Ph.D.,** *Founder President, Institute of Science and Religion, Navi Mumbai, India*
17.30 – 18.30	**Valedictory Ceremony**
18.30 – 19.30	**Dinner**

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PLENARY SESSION TO INTRODUCE THE THEME OF 'SCIENCE AND SCIENTIST – 2017'

Chairpersons: M.V. Jagannadham, Ph.D., *Sr. Principal Scientist, Centre for Cellular and Molecular Biology, Hyderabad, India*
&
A. K. Mukhopadhyay, M.D., *Professor & Head, Laboratory Medicine, All India Institute of Medical Sciences, New Delhi, India*

Plenary Talk 1:

Dissecting the Central Dogma of Subject-Object Dichotomy in the Modern Science

Bhakti Niskama Shanta, Ph.D.
Gen. Secretary, Sri Chaitanya Saraswat Institute
Govinda Shetty Palya, Konappana Agrahara, Electronic City, Bengaluru, Karnataka, India
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Abstract

Modern science takes the "observer" for granted and scientific investigation are completely dependent on scientists' "objective" observation. This "objective" observation of modern science is not seriously concerned about the objective knowledge of self (scientist) and thus we do not find in modern science an existential inquiry of the subject himself. Founded on Cartesian dualism this subject-object dichotomy continues to be a central framework of modern science to understand the reality, where the science practitioners believe that subjective viewpoint must be diminished as much as possible. However, modern science continually failed to device a consistent framework for objective reality independent of the observer. Scientific validity, reliability and predictability are all observer dependent and hence, in the recent time, following a mindset of constructivism, a few scientists have started questioning this subject-object dichotomy and they have started proclaiming the impossibility of objectivism. In this framework reality is a personal interpretation or subjective construction, which is attained by the interaction of subject (organism) with the object (environment). According to this view different ways of looking at the world can produce different realities. This paper highlights the limitations of both of these stands and explores the remedy in the wisdom of *Bhagavat Vedānta*.

Introduction

Ever science Charles Darwin proposed his concept of "objective evolution" (OE) it became a prominent influential idea that has a lasting influence on modern scientific thinking. 20th century witnessed a new synthesis work, uniting the nineteenth-century Darwinian theory of OE and modern genetics, which dictates the species classification and the rest of biology. OE makes an attempt to eliminate the static pattern of species into fluid process and in this frame work biologists try to proceed through a chain of causal events from microevolution (mutations that alter genes) to macroevolution (process of appearance of novel forms). However, despite several intense efforts for more than hundred and fifty years, till date natural history could not be established as a real consistent science practice and life offers severe challenges to the belief that everything can be explained by a small number of natural laws. Even though, biologists are still confused about the real meaning of the term "natural selection" (this idea was originally taken from the personal subjective selection of breeders), yet some argue that natural selection selects for function rather than structure.[1] In a sentient living organism a single chemical structure of a biomolecule can execute many different functions and also one function can be produced by several different chemical structures.[2] Therefore, throughout the history biologists always failed to establish a relationship or "bridge laws" between Mendelian genetics (phenotypic features characterized functionally) and molecular genetics (genotypes characterized structurally).

All scientific knowledge, including different theories in physical sciences is derived from subjective human phenomena and modern scientific investigations cannot make themselves independent of this. This inescapable impasse poses the most interesting problem to the physicist: how these subjective phenomena correspond to what does not depend on subjective experience – "objective knowledge". We know that Quantum Mechanics is a progress from observer independent classical physics to an observer

[1] Rosenberg, A. (1994). *Instrumental biology and the disunity of science*. Chicago: University of Chicago Press.
[2] Martin, A.C.R. et al., 1999, Protein folds and functions., *Structure*, Vol. 6, pp. 875-884.

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dependent description of reality, where it has shown us that we are not directly dealing with the Science of Object but we are dealing with the science of knowledge of the object. Hence, physics has realized that matter does not have an independent existence apart from consciousness. Subject and object are inseparable entities like two poles of magnet or two sides of coin. Subject cannot exist without a corresponding object and we cannot call an object an "object" without its relation to a subject. Within a mundane consciousness when one invokes any concept of subject or self that inherently implies the existence of an object or non-self. The relation of subject to object has always been the fundamental problem in modern science. Modern science has continually failed in its attempt to establish the material basis of the world and it has no real knowledge about the unity of nature.

Einstein tried to play the role of an architect of grand unification in physics where he aimed to connect everything else into a single skimping system, space with time and motion, gravity with electromagnetism and cosmology. Following the same attitude physicists are still working on the unification of four fundamental forces with a belief that if it is achieved then science can become a perfect system of thought. However, it is not sure how scientists with their limited tools in hand can ever manage to understand the mysteries of mind and consciousness which are the basis of physical sciences, biological sciences, social sciences, humanities and so on. Science cannot test the subjective experience of the scientist in acid baths of experiment and modern science has always suffered critical blemish in addressing the topic of mind, consciousness and self. Hence modern science could not find the unity of scientific study of object (atoms, molecules, forces and so on) and subject (scientist). By its very nature the scientific method alone is always vulnerable to the challenge offered by subject-object dichotomy and good science practice needs proper philosophical foundation to overcome this vulnerability. We propose in this paper that the wisdom of *Bhagavat Vedānta* can be that philosophical foundation which modern science needs to make it a complete science.

Abortive Search of Unity in Modern Science

In modern science we have witnessed several attempts to unify knowledge and its root can be found in Aristotle's unified hierarchy of sciences. Based on their purpose Aristotle divided sciences into three categories: 1. Theoretical Sciences (are concerned with knowledge alone for its own sake: metaphysics or theology [*highest theoretical sciences*], mathematics, and physics), 2. Practical Sciences (are for doing: ethics and politics) and 3. Productive Sciences (are for making: poetry and rhetoric). Considering them as basic, Aristotle placed theoretical sciences at the top of the hierarchy because they inquire about the first causes and Aristotle also believed that the individuals who know this science in its truest sense can also understand the underlying subjects.[3] The above hierarchy is also applicable within theoretical science and according to Aristotle one cannot become a good mathematician or physicist without having a proper understanding of the theological science. Even though Aristotle maintained that physics is the science of sensible substances and their causes, but at the same time he emphasized that there exists more fundamental substance (*ousia*) and in addition there is a more fundamental source of motion. According to Aristotle it is the study of this most fundamental substance and source of motion that will help us develop proper understanding of reality in physics.

However, ignoring all of that modern science emphasizes empirical knowledge and majority of scientific community is simply critical of revealed truth (bonafied scriptures), which advocates the wholistic concept of reality. By denying the wholistic concept of revealed truth which sees the unity in Absolute (God), the approach of modern science has always failed to find the integration of knowledge of different aspects of reality. In the field of cybernetics there is a belief that it is the feedback mechanism that enables both biological and abiological (artifacts) systems to be goal oriented (*teleological*).[4] Even though they could never understand how a mechanism could perform in the manner biological organisms were known to behave, the scientists in the field of cybernetics simply believe that feedback mechanism can unify the knowledge of functioning of biological/social and abiological systems.

Following the same line of thinking the scientists in the field of General System Theory also believe that rather than focusing on the constituent parts of different things, one must study the organization of different parts into wholes.[5] According to this approach the principles of mechanical organization like negative feedback can be equally applicable to mechanical (belongs to the domain of physics), chemical and biological (social) systems. Direct or indirect influence of these approaches can be seen in the fields of complexity theory, self-organizing systems, Dynamical Systems Theory and so on. Following directly or indirectly the path of theory reduction, all these methods only try to reduce the theories of higher level sciences (say, biology) to the laws and theories of lower level sciences such as physics and chemistry. In their search for unification of disciplines like physics, chemistry, biology, psychology, and sociology, in these approaches scientists try to reduce the theories of each higher discipline to theories of a lower discipline. Despite the fact that biologists have continually failed to reduce the theories of functional biology to molecular foundations, these approaches are also simply based on blind presumption that lower level theories (dealing with parts) have laws that can describe the behavior of upper level theories (dealing with structured whole).

Present scenario in modern science reveals that any one small set of theories or models cannot accommodate all others and thus modern scientific approach is nothing but a continual patchwork of theories and models that will sometimes be compatible and sometimes not. Moreover, the mechanistic approach to understand life will always fail because in such an approach scientists obliterate the life phenomenon itself by taking apart the integrated organic whole. Following this illusory path of mechanistic approach scientists could not understand the distinction between correlation and causation. Thus adhering to a dualist stand they blindly believe that the conscious states are simply correlated with brain processes. Similarly, imagining a privileging DNA's role in biological processes like inheritance, evolution, and development, DNA remains the only relevant causal factor in the mind of the biologists for all their explanation. However, we all know that DNA alone cannot produce itself, nor it can produce all those molecules that we observe in a functional cell. In other words, following a mechanistic route scientists are only good at decomposing a blade of grass (a living cell) and they cannot put it back together again.

[3] (Metaphysics A.2)

[4] Rosenblueth, A. Wiener, N., and Bigelow, J. (1943). Behavior, purpose, and teleology. Philosophy of Science, 10, 18-24.

[5] Bertalanffy von L. (1951). General system theory - A new approach to unity of science (Symposium), Human Biology, Dec 1951, Vol. 23, p. 303-361.

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Following the vision of 'logical positivism' or 'logical empiricism' scientists emphasize only positive knowledge and maintain a skeptical stand towards philosophical and theological way of grasping the reality. Scientists only rely on sensory experience as the source of knowledge and they believe that scientific laws can serve as the unity for the phenomena that is available to the senses. Following the path of theory reduction scientists have unsuccessfully tried to unify the vision (subjective) of different sciences. Hence, some hold the notion that all sciences are grounded on different scientists' personal experiences[6] and thus dependent on their individual experiences different scientists construct their own different worlds. Modern scientific knowledge, which is grounded on observation and experimentation, is completely perplexed about the relationship between subject and object, because such type of approach always faces difficulties in proceeding beyond the individual views/observations to generalized scientific claims. Hence, scientists really cannot say whether the foundation of modern science is based on object or subject, or both.

Science is not Sacrosanct and Science Takes Place within an Orthodox Tradition

Even though the seed of modern science can be traced back to the ancient Greek philosophy, in the modern time empirical sciences have superficially tried to follow a process of independence from philosophy which has never been achieved. Science cannot be independent of philosophy because scientific method itself is hermeneutically conditioned and its dependence on philosophy becomes more apparent when one reflects upon the teleologically conditioned aim of modern science. Both hermeneutical and teleological conditionings come from a particular tradition. Scientists simply presume that they can arrive at truth because they erect their conclusions on data they obtain through sensory perception. On the basis of this premise scientists criticize different subtle philosophical and religious claims because they strongly believe that their information originates from real rather than imaginary things. This conviction of scientists is inherently based on another implicit presupposition that real things are only those that can be accessed through gross sensory perception assisted by technological advancement. This adherence of scientific epistemology to empirical (Greek word *empeiria* means experience) conditioning in turn comes from teleological and hermeneutical conditionings. The entire scientific enterprise is based on scientists' implicit presupposition of what real means and the ideas come into science from the side of the hermeneutical conditions of scientific methodology.

Is there any diction between theory and fact? This is an important question because we cannot know the truth of theory without understanding where fact ends and theory beings. In general theory is nothing but a mere subjective "description of facts" from the observed data and hence a distinction between theory and fact is dependent on the angle of vision of the subject. According to the view of an individual scientist certain data may be apparent, given to everybody alike but that does not guarantee that everyone will be on the same page because different scientists may see the same data in very different ways. This important point is not yet realized by most of the scientific community. The scientific knowledge is based on data of experience and the data of experience is dependent on the consciousness of different individuals. Modern science does not have a clear means to distinguish what is datum and what is not, because scientists do not consider seriously the effect of their preconceived ideas coming from a background of theory on the conclusions that they make in science. It leads to two important questions: 1. is it possible to discover data of pure experience, and 2. if data of pure experience exists then where we can find the same?

Modern science is caught in duality of subject and object, things and their appearance, mind and matter, and this duality is not the data itself but scientists' distorted accruals of data of pure experience. What is the scientific means to overcome this duality and is it possible to approach the data of pure experience in science practice? What is the source to obtain such a data?, to whose experience do they belong?, what is the state of mind or consciousness of such fascinating beings?, these are all important questions that one should seriously inquire about. People with mundane consciousness must find it hard to overcome the subject-object duality because an individual with such lower consciousness can only think of things as part of his/her own self or else something other than his/her own self. Furthermore, in modern science a scientist regards objects as something other than his/her own self and in such a science practice introspection cannot be recognized as an objective experience. Influenced by the consciousness of mundane plane we experience things in a distorted manner and in that state we cannot have a pure experience. Instead of focusing on how one can overcome this mundane consciousness, at present scientists are only busy in producing literature that contains nothing but different individuals' varied wooly experience of true reality.

Modern science is nothing but the interpretation of scientist's experience of the data and such a data is accessible to all. However, science cannot make the data of scientist's experience as the starting point because scientist's experience is always evolving right from his/her birth and it is also completely dependent on the beliefs that accompany the scientist. When a scientist follows the process of knowledge gaining in modern science, the data of his/her experience is totally amalgamated with interpretations and hence it is not viable to discriminate what is a datum and what is not. Therefore, scientists should not pretend that they start with primitive data because what data a scientist has in his/her experience may be entirely different from the data of pure or original experience. Scientists should examine how the data of their experience, their beliefs about themselves and objective reality arose in the first instance, and how they contribute to them by the actual cognitive processes which are always going on in their minds.

Scientists will agree that they obtain information from two sources. The suggestions of previous studies help a new scientific research to identify a problem and a new scientific research cannot initiate itself by remaining completely independent of previous studies. This indicates that the progress of science is dependent on both empirical data and the suggestions of previous scientists. Thus scientific research is conditioned by both tradition and testing. Moreover, the ultimate goal (teleological conditioning) of modern science is to build a cosmology (an all comprehensive worldview) and this is exactly the goal of metaphysics and ontology that philosophy and religion try to address. Therefore, the difference between science, philosophy and religion is one of the method rather than aim. This common goal of science, philosophy and religion must be kept in mind when one deals with the questions on consciousness, origin of life, matter, biodiversity and universe.

[6] Carnap, R. (1928). *Der logische Aufbau der Welt*. Berlin: Weltkreis.

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In the course of time, a myth of scientific rationality was developed from a continual uneasy atmosphere and the conflicts between Western science and religion, where scientists have started claiming that their scientific methods can produce the absolute universal truth about reality which religion and traditional philosophy cannot produce. However, in recent time scientists have gradually started to realize that the scientific method can only produce partial approximations and that scientific method is inapt to produce any absolute infallible truth. The progress of science is helping us realize that by utilizing scientific methods scientists can proceed for ever to erect increasingly so called truer (although problematic and improvable) rebuilding of reality. As Mario Bunge concludes[7]:

> "Hence, science cannot have an ultimate goal, such as building a complete and flawless cosmology. The goal of science is rather the ceaseless perfecting of its chief products (theories) and means (techniques), as well as the subjection of more and more territory to its sway."

Scientists dealing with studies on consciousness, origin of life, origin of matter (majority of scientist simply presume that matter is primitive), origin of biodiversity, origin of universe and so on, should first recognize the need to consider the content and scope of science. The goal (teleological conditioning) of science demands that scientists must test their hypotheses with the empirical source of information. Empirical science can only be applied to any theory that can be tested empirically. The study of origin (of life, matter, biodiversity and universe) and the subtle subjects like mind, consciousness, soul, God, fulfillment and so on, is beyond the scope of limited methodology that modern science has adopted.

Moreover, being influenced by scientific tradition, in science the conception, formulation, and advancement of hypotheses take place a priori and then scientists try to prove/disprove hypotheses by empirical testing. Previous scientific teaching helps scientists' construct their hypotheses and thus the work of scientists is not solely a product of facts produced by nature but is also influenced by human reason. If we carefully analyze this scientific method then it appears that science take place within an orthodox tradition and this tradition subsumes (hermeneutical conditioning) all that scientists bring to scientific method.

Conditioned by this orthodox tradition scientists simply presume that things or events that can be observed in space and time exist and can be taken as evidence on which to build scientific knowledge. This orthodox tradition also bestows a primary revelatory status to natural phenomena and in this tradition historical phenomena only play an assisting role in the revelatory process. Thus, scientists use testing hypotheses as the ultimate ground of scientific truth and it renders the best results only when applied to the recurring cycles of nature.

This orthodox tradition also does not allow scientists to build their views on the basis of any divine revelation (scriptures) and thus scientific studies do not include any topics on soul, God and the eternal constitutional relationship between souls and God (devotion). On the other hand, all bonafide religions are based on divine revelation (Scriptures) and Scriptures reveal that both material (things or events within material space and time) and spiritual (reality beyond material space and time) realms exist. We observe the greatest incongruity between the religion and modern science because being influenced by orthodox tradition scientists embrace empiricist foundationalism and thus in science the divine revelation (Scriptures) is plainly rejected as mere fantasy.

We do not have any universal reference point in modern science which we can make as the basis to evaluate whether the beliefs that scientists have are real or they are illusory. In modern science, there is no way to know the beliefs that scientists have are pure or impure and thus it can neither be assumed nor denied that they are an outcome of interpretation and illicit inference. Being conditioned by orthodox tradition, majority of scientists never seriously doubt the foundationalist role conferred in science to empirical testing. On the other hand, even an elementary education in religious tradition helps the individuals to clearly understand the limits of empiricist foundationalism. Thus, scientists have no rational justification to dismiss the wisdom of Scriptures because the methods of religion and modern science appear to be mutually exclusive of one another.

Is Science Able to Explain the Scientist?

The study of consciousness and the objects of direct experience are often thought to be inappropriate to modern scientific research because majority of scientists feel that first-person descriptions do not reach to the level of genuine causal explanations. Modern science does not have any tangible scientific explanation for the feelings that individuals have when they see a particular color or when scientists introspect about the act by which they entertain a belief, and so on. In general it is believed in science that there are three dimensional substances that move through time. However, like its spatial dimensions, whether time is also a part of an object or not is an open question which is not been seriously investigated in modern science. All the objects that we empirically observe in this material world undergo changes under the influence of time and yet we have no real idea about the relationship of time on the objects that we observe around us. Even through modern science deals with events in space and time, with an atomistic presupposition in mind, scientists in general try to understand everything as a physical object that is more or less constant. Assuming metaphysics fitted to its procrustean bed the approach of modern science has no scope for studying anything that cannot be represented in the physico-mathematical way.

Whether mathematical conclusions can be taken to have direct physical implications or not is also an open question. Following the illusionary path of Descartes scientists only attempt to reduce all studies to the same degree and method. Thus, modern science practice is nothing but a mathematical (knowledge in the imaginable) and physical (knowledge in the sensible) abstraction, but it has completely ignored the metaphysical knowledge (knowledge in the pure intelligible). Following this limited approach scientists may study different phenomena with an aspiration to unearth the real but, the method that they follow will never lead them to an ontological completion. Modern science only deals with observable and measurable realm, and this is the reason that "scientist" (intelligible being) is a complete mystery to the modern science. Modern scientific methods can only infer but cannot directly measure or unravel the essence.

The researchers in Artificial Intelligence (AI) also try to build a closed domain of virtual objects, properties and relations so that computer can map

[7] Bunge, M. (1998) *Philosophy of Science: From problem to theory* (Revised edition), Vol. 1, p. 34, New Brunswick Transaction Publishers.

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it. Even though computer cannot have a direct experience of meaning of the command that it receives, it still manages to act mechanically in synchrony with the commands because it is a closed environment. To avoid ambiguity a programmer must go for simplistic assumptions like a closed environment and thus considers only limited parameters, small number of objects, properties and relations. On the other hand, a living agent (say, a scientist) tries to understand all feasible eventualities that could be obtained in this world. This gives an indication about the limitation of finite mechanistic approach that is locked in a microworld and why such mechanistic approaches like AI cannot approximate the open-ended organic intelligence that we observe in living entities.

Some may think that the world of objects that scientist experiences is nothing but a summation of data of perceptual experience picked up by the brain of the scientist by a series of operations. This route of thinking is the foundation of the simplistic belief that AI can be developed by just reverse engineering the brain. However, this naive concept has many severe flaws and the real function of world construction that we observe in living entities is not a straight forward one that we see in machines. This is because unlike computers, the consciousness of living entities may overlook certain sense data, reclaim others from memory, bewilder sensations with perceptions and so on. Scientists are looking for necessary and sufficient lawful regularities that govern the structures of a particular realm of phenomena which they have chosen to study. Deterministic rules of physical sciences are the foundation of AI but throughout the history of modern science scientists have always failed to provide a rule based explanation for the process of living entities' experience of possible objects from the flux of sense data. Therefore, it is categorically incorrect to use machine analogy (which is based on rule driven algorithms) to understand the subjective experiences of living entities.

In modern science, scientists are only busy in examining the conclusions but they never examine the conceptual models, concepts and ordering patterns that they employ. Modern science following the route of reductionism believes that everything can be explained by dividing the things into parts and by narrating how the parts behave. However, a mere explanation is meaningless without having a proper understanding of what an explanation (subjective quality) is. The reductionist explanation that modern science follows is one type of explanation which may work reasonably well for mechanical machines say, a robot (although it fails to address the external teleology – the purpose [*subject*] is outside the system), but it will always fail to address life (the living cell/organism and subjective qualities like personality, love, affection and so on that life displays).

Depending on the approach that one adopts there is also a possibility for many varied explanations and science cannot judge which one is the correct explanation. Science cannot reject this issue by considering it irrelevant because the type of explanation that we want to come up with affects our formulation of different questions, hypotheses and experimental setup. In other words, the effects of the approach one adopts cannot be separated out. Modern science has no philosophical foundation to tell us anything for certain about the data of pure experience. Hence, following the framework of modern science we have to accept that the very existence of scientist (self) is a mere hypothesis. Modern science only consists of man-made models and moreover, by simply basing philosophy on individuals' varied subjective experiences we cannot solve the problem either. We have to inquire about the epistemology by following which we can experience the true reality.

Bhagavat Vedāntic View of Self

Modern science is based on the assumption that scientists can understand things without understanding themselves and thus science does not have the knowledge of scientist. On the other hand, according to *Bhagavat Vedānta* the science of self realization is most essential aspect of any real understanding of things, which requires proper spiritual training than the simplistic methodology that we practice in modern science. Scientists may think that the search for the ultimate grounds of self that *Bhagavat Vedānta* advocates is nothing but one's blind decision to jump into an unknown deep well but in this journey inside an unknown well only one can find the ground of how things appear and is approached and studied.

In modern science we generally do not inquire about the relation between the way we perceive the objects around us and our attitudes. However, according to *Bhagavat Vedānta* the way we know these objects around us is completely dependent on our attitude (consciousness). In other words, it is the different attitudes (consciousness) of different individuals that make them meet these things differently. Hence, the things that we run into are not simply given, as they are assumed in modern science, but they are dependent on our attitude or consciousness. As we have briefly discussed in the previous section, modern science does not seriously inquire about the question: Are space and time really a part of very make-up of specific things? Following the route of reductionism scientists may dissect a thing but they will not find space and time inside. What they find instead are mere external relations between its parts, bits, and pieces. Thus, space and time do not seem to be in the thing but we need them to conceive the possibility of different arrangements of its parts. There is no serious inquiry in modern science about how this possibility of spatial structuring comes into our understanding of thing. Even though, space and time lends its particularity to the things, modern science only tries to derive everything from general theories and thus it has ignored the particularity.

According to *Bhagavat Vedānta*, we encounter the cage (limitation or conditioning) of space and time (illusion or *māyā*) due to our wrong attitude or material consciousness. Merely knowing that our attitude makes us see things differently is not enough because according to *Bhagavat Vedānta* we have to trace the original reference to things. *Bhagavat Vedānta* teaches that things' true character remains concealed to us unless we trace and establish ourselves in the things' true relation to us. As we see in modern science, in the egocentric misconceived life one may think that things are dependent on his/her whim and that he/she can manipulate them for his/her own pleasure (exploitative attitude or material consciousness). Due to our material consciousness we try to manipulate the character of things for our own purposes. German philosopher G.W.F. Hegel also emphasized that the apparently obvious and solid things change constantly based on spatiotemporal interplay between us and things (givenness and concepts). Thus in such type of life we do not have any lasting truth and we are only caught in a changing relationship between thing and us. With a mundane consciousness we may encounter things in space and time (givenness), and it is the concept (the way we determine and define them) that makes the thing we encounter into something.

Material life is nothing but a life that is relied only on our ways alone. However, *Bhagavat Vedānta* advocates that one can overcome that illusory life (*māyā*) by practicing a proper discipline under the guidance of a self realized

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saint (bonafide Guru). It is commonly observed that people naturally believe in their own (bodily/spiritual) existence in a material/spiritual world and they also believe that like theirs other living entities also have their own (bodily/spiritual) existence. In an inquiry about self it is impossible for an individual to get rid of the influence of his/her own philosophical position from his/her introspective appraisals. If we follow the path of modern science, then we will realize that the "thing" is nothing but a certain sort of explanatory scheme or approach to anything studied. Hence, *Bhagavat Vedānta* advocates that in the path of self realization one needs the help of self realized saints (Gurus) form the line of bonafide disciplic succession who help the sincere students to transcend the plane of misconception (reality erected by false ego which acts as a dense layer of ignorance to true knowledge). It is quite possible that one can realize the true nature of reality which is not an object that we dominate as a subject. By sincerely following the path that *Bhagavat Vedānta* advocates, we will realize that everything including us is an object for the pleasure of Supreme Subject (dedicative attitude or the original spiritual consciousness of every individual self) or the Supreme Personal Absolute.

In Eastern tradition also we can find many schools of atheistic philosophy and most famous atheist in Indian philosophy was Charvaka Muni. The philosophy of Charvaka Muni is paralleled by many Western philosophers and it clearly reflects in the materialism that is predominantly practiced in modern science. The followers of this philosophy believe that consciousness is the byproduct of the chemical combinations of different material substances (atoms and molecules) and thus in this concept with the dissolution of this physical body, neither soul nor consciousness remains. Following this line of thinking many argue that just as the combination of different chemicals produces something more than the individual chemicals themselves, the mechanical and chemical combination/accumulation of different material elements produce consciousness. Thus some of them believe that with the dissolution of this fleshy (gross) body, nothing remains and Epicurus first advocated this philosophy in the West.

In Eastern tradition the Buddhists believe that when the physical (gross) body is dissolved, the subtle body (the mental system) goes on to take another birth. Buddhists accept transmigration (reincarnation or *metempsychosis*) from one body to the next. According to Buddhists, although the gross body may vanish, the individual living entity must enter another body following the law of karma. Buddhism proposes that if one practices a particular way of living then he/she can dissolve the subtle body also and thus nothing remains (*Śūnya*). Thus, according to Buddhists there is no eternal soul. According to Vedāntic literature Lord Buddha taught this philosophy of *Śūnyavād* to stop the animal killing that was practiced at the begining of present age – *Kali-yuga* by the unqualified persons on the name of sacrifice. The verse 9 of *Sri Dashavatara-stotra* by Srila Jayadeva Goswami explains:

nindasi yajña-vidheḥ śruti-jātam
Sadaya-hṛdaya darśita paśu-ghātam
keśava dhṛta-buddha-śarīra jaya jagadīśa hare

Translation: Oh Keśava! Oh Lord of the universe! Oh Lord Hari, who have assumed the form of Buddha! All glories to You! Oh Buddha of compassionate heart, you decry the slaughtering of poor animals performed according to the rules of Vedic sacrifice.

Sripad Adi Shankaracharya also gave a similar philosophy with a slight difference. Buddhist school claims that there is no eternal individual soul and Sripad Adi Shankaracharya also said that there is no permanent individual soul. However, the philosophy of Sripad Adi Shankaracharya accepts the existence or conscious substance, Brahman and for the followers of this philosophy the Brahman is the ultimate reality. Buddhists believe that ultimately there is nothing (*śūnyavād*) and the followers of Sripad Adi Shankaracharya believe that ultimately there is an eternal conscious substance and that is Brahman (*Kevala Advaita* or *Māyāvādā*). This is the major difference between Buddhist school and the school of Sripad Adi Shankaracharya. Thus the followers of *Māyāvādā* believe the existence of consciousness, however, for them the consciousness of separate existence is false. Under this *Māyāvādā* philosophy there is no scope for the existence of individual soul and any notion of individual soul is a mere reflection of the ultimate conscious substance. Sripad Adi Shankaracharya gave the example of reflection of the moon in mirror and if we remove the mirror then there is no reflection. Therefore, under this philosophy different individual souls are mere reflection of common source – *Brahman*. This school claims that in reality all individual souls are one and the same with Brahman. They also believe that by certain practice one can dissolve the mental system and thus the consciousness of individuality vanishes in *Brahman*.

Famous Nobel Prize-winning Austrian physicist Erwin Schrödinger also developed his thoughts on the nature of consciousness and Self, specifically from Sripad Adi Shankaracharya's perspective of Vedānta. Quoting Vedānta inline with *Kevala Advaita* or *Māyāvādā*, Schrödinger was mainly trying to explain that consciousness is only one, singular, identifiable with its universal source (Brahman) and he believed that the perceived spatial and temporal plurality of consciousness is merely an appearance or illusion (*māyā*). However, it is a common misconception that is found among the monists (Sripad Adi Shankaracharya's *Kevala Advaita* or *Māyāvādā* philosophy) in Indian Vedāntic tradition. The verse 2.12 from *Śrīmad Bhagavad-gīta*[8,9] completely refutes the idea of singularity of consciousness, where Bhagavān Sri Krishna says to Arjuna: "*na tv evāhaṁ jātu nāsaṁ na tvaṁ neme janādhipāh na caiva na bhaviṣyāmah sarve vayam atah param* – Never was there a time when you, I or all these kings did not exist, just as we exist in the present, so have we existed in the past, so shall we continue to exist in the future." Therefore, according to the Vedāntic view, the plurality of individuals is an eternal fact, and it is confirmed in other Vedic sources (*Kaṭha Upaniṣad*

[8] Sridhar BR. (2006) *Śrīmad Bhagavad-gītā: The hidden treasure of the sweet Absolute*. Sri Chaitanya Saraswat Math.

[9] Prabhupada ACBS. (1972) *Bhagavad-gītā as it is*. Bhaktivedanta Book Trust.

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2.2.13 says: *nityo nityānāṁ cetanaś cetanānām* – We are eternal, we are many, and Supreme Absolute is also eternal, but He is one) and by authentic teachers like Sripad Ramanuja Acharya and other Vaisnava Ācāryas. *NPR* also reported in 2010:

"there are 10 times more microbial cells on and in our bodies than there are human cells. That means that we're 90 percent microbial and 10 percent human..."[10]

Hence, apart from our own individuality, we must also accept the individualities of all those microbes on and in our bodies. We cannot deny the individuality of all those microbes, by stating that their individuality is mere illusion (*māyā*). In the healthy body of a multicellular organism, every individual cell, despite having its own individuality, is meant to work for the welfare of the whole body. Similarly, *Bhagavat Vedānta* advocates that we are living in an 'Organic Whole' and every individual unit of this whole is meant to dedicate itself for the satisfaction of the Center – the *ādi-puruṣa* or primeval personal Absolute. That is the actual spiritual nature of all living entities. Vedic literature explains that the mundane world or 'illusory world' is a perverted reflection of the world of absolute (*Śrīmad Bhagavad-gīta* 15.1 says: *śrī-bhagavān uvāca ūrdhva-mūlam adhaḥ-śākham aśvattham prāhur avyayam chandāṁsi yasya parṇāni yas taṁ veda sa veda-vit* – The Supreme Lord said: It is said in the scriptures that this material world is like a Peepul tree, roots up, branches down, endless yet transient. Its leaves represent the nourishing verses of the *Vedas*. One who knows this tree is a knower of the *Vedas*.)

In contrast to Darwinism, symbiogenesis proclaims that life did not take over the globe by competition, but by cooperation. In the body of an organism, there are different organs like heart, kidneys, lungs and so on, which perform different tasks to serve the function of the body as a whole. One organ does not try to become another. In the similar manner, different living entities and also their environment are related to each other like an organic whole. Evidence in symbiotic exchanges confirms that the sphere of life is like a net, with the different species representing the nodes of that net (network). If changes occur in the network as a whole, then the various nodes (species) change accordingly, to maintain the harmony of the network of life. This viewpoint is completely ignored by many modern evolutionists.

We have to first understand our real self to overcome the life that we are living in a notion of false self (indentifying material body as our true self). In an ordinary consciousness we only observe the objects (or matter) that we can experience and thus we do not try to seriously think about 'who is the seer', 'who is the listener', 'who is the knower' and so on. Therefore, in a material analysis we simply experience matter and ignore the 'self' or the 'subject': 'listener', 'knower', etc, because we do not experience them. In *Bhagavat Vedāntic* philosophy the path of self-realization or spiritual life begins when the subject becomes the object of its own study. As we progress to a higher level in our spiritual journey we can also experience the self and that is known as self-consciousness or self-realization, which is beyond the material sphere. In such a spiritual plane both object and subject are spiritual and the subject-object duality is negated by simultaneous identity and difference between subject and object. In *Bhagavat Vedāntic* view of Sri Chaitanya Mahaprabhu it is known as *acintya bedha abedha tattva* – simultaneous difference and non-difference. In material sphere sometime human being is also conscious of consciousness and yet he/she is also conscious of matter (non-conscious body or bodily consciousness). Under the guidance of an expert self-realized saint one can transcend this transient plane of matter (bodily consciousness) and can attain the spiritual plane where everything is made of the same conscious principle. It is known as science of the soul in *Bhagavat Vedāntic* philosophy. In western philosophy Aristotle called it pure form without matter (*noesis noesios*). The cultivation of this science of self is missing in modern objective science and without including the study of self (scientist) in our scientific studies we cannot achieve a complete scientific understanding of reality.

Conclusion

Modern science tries to see everything as a separable thing from everything else and thus can never overcome the subject-object dichotomy. Scientists also simply presume that space is same everywhere and only based on this presumption they come up with universal laws. They also presume that everything is made up of tiny things (say, atoms, electrons, proton, quarks and so on), each of which are always the same and thus they try to explain all differences as different arrangements of these same things. Thus modern science forces the scientists to construct a world that is made of arrangements of uniform units of matter and space. Without this vision of seeing everything as arrangements of uniform units, scientists cannot quantify and mathematize the things that they observe. Thus with this egocentric vision modern science tries to reduce everything including scientist (living entities) to an object that is driven by the mathematical equations or laws.

Scientists must realize that knowledge received by sensual experiences always faces problems when the objects are too small (say, an electron) or too big (say, gigantic planets). Furthermore, a living entity existing in the plane of mundane consciousness has four defects. They are *bhrama* (tendency to make mistakes or arriving at false knowledge about something), *pramāda* (the tendency of being inattentive and being illusioned), *vipralipsā* (the propensity of living entities to cheat others) and *karaṇāpāṭava* (the imperfectness of senses). Therefore, without the help of *Śabda-brahma*, or the revealed knowledge, the evidence collected by only direct sense perception and inference is always liable to be affected by the aforementioned four defects. But when these evidences are

[10] Bacterial bonanza: Microbes keep us alive. NPR: http://www.npr.org/templates/story/story.php?storyId=129862107

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guided by *Śabda-brahma* they can also become perfect. In other words, our senses must be engaged in the process of higher inquiry under the guidance of authorities who are well versed in the system of knowledge presented in *Bhagavat Vedānta*.

Plenary Talk 2:

Harmony of Vedanta and Science

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1 Introduction

In the 20th and the 21st century two of the most important areas of research are cosmology and biology. Due to the advanced research in biology, it has become important to study biology as an information and communicative paradigm. According to James A Shapiro, "*The cognitive, informatic view of how living cells operate and utilize their genomes is radically different from the genetic determinism perspective articulated most succinctly, in the last century, by Francis Crick's famous "Central Dogma of Molecular Biology.* [1]" Organisms acquire knowledge about their environment and respond to them. One of the focus areas is the ability of bacterial to adapt to the changing environments. It underlies the modern biological understanding of signal transduction [2]. Signal transduction has become an important factor in the information processing approach that is a foundation in the cognitive revolution in biology. Another vital area is the study of behavioral aspect of bacteria and microorganisms. There are parallels not only at the functional level but also at the level of molecular mechanisms.

2 Inferring cell cognition

James A Shapiro has applied the concept of cognition to cellular function based upon the experimental facts and their conceptual explanation. Scientific methodology has three stages in arriving at an explanation about any phenomenon. They are (i) observation, (ii) hypothesis, and (3) repeatable verification of the hypothesis by the experiments. These are based upon at 3 facts, (i) The cells do not act blindly. Cells monitor what goes on outside the cell as well as what goes on inside. Cells continually use this information and by using it, they adjust their actions, biochemistry, metabolism and cell cycle. In this way they achieve the correct output. (ii) There is clear evidence that genome changes are neither random, nor accidental. If the genome changes as a result of accidents, they are fixed by the cell. Cells turn on systems for restructuring their genomes. So Shapiro coined the term Natural Genetic Engineering, as the source of genetic change. Cells are acting on their own genomes in a large variety of well-defined non-random ways to bring about change. Shapiro was much assisted in his concepts by his teacher Barbara McClintock, who had discovered the transposable elements. These natural genetic engineering systems are intelligent systems which regulated and are sensitive to biological inputs. (iii) In this situation evolution cannot be explained as a result of accumulation and fixation of random changes. Species diversity and evolution must have one of its causes inside the intelligence that is found within the cell [3].

Citing an example of the work of Charles Monod, Shapiro and draws the conclusion that cells make intelligent decisions, based upon assessment of the available conditions and its needs. These biochemical processes cannot be explained as merely complex chemical reactions. E.g. Bacteria completely consume the glucose sugar that provides the most rapid growth before switching to the less digested ones. Different bacteria use similar transport systems to sense the presence/ absence of glucose in their environment. However the molecular components that are utilized for transferring information to the genome are very different. For example in E. coli an intracellular second messenger molecule is used to indicate that glucose is absent. It has no structural connection to the glucose transport process. So this molecule is purely symbolic [3-5].

According to Shapiro, "*not enough experiments have been done to show whether cells respond in a deterministic way. What we know for sure is that even these smallest* ***cells use sophisticated sensory and intracellular communication processes*** *to discriminate between alternative nutrients.*[6]"

Shapiro also highlights the symbolic aspects of cellular function such as the concept of checkpoints. For example there is a widespread agreement in the community of biologists that it is cell decision making process that results in the programmed cell death following a trauma. After DNA damage, the eukaryotic cell may either do a checkpoint analysis, and repair the damage and resume the cellular process. Or, it may induce organized cell suicide following a cascade of events called apostosis, after which it causes organized disintegration. In this way the cell chooses between 'repair and survival' and 'apostosis' based upon environmental conditions. These include nutrient availability and presence of cytokines which are the intercellular signaling molecules. Most bacteria are now well known to display various multicellular behavior which involve use a large vocabulary of chemical symbols. Hence it is a concluding remark of

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James A. Shapiro that cell cognition and intracellular communication are central to all levels of life and deserve detailed empirical and theoretical analysis [6].

3 Epistemology of modern Science

Modern scientific methodology is primarily based upon two epistemic levels. Firstly, it is based on direct sense data observation/ recording and their analysis. E.g. one may observe that fire causes smoke. The next level is the application of these inferences in unknown situations where a cause is inferred based upon its symptoms. For example one may observe smoke and infer that the cause may be fire. However in mathematics certain intuitive concepts have been discussed in certain schools. For example the Socratic school asserted the world of ideas. In modern biology from a philosophical analysis, we increasingly find that the cellular processes have a contribution from the world of ideas and concepts. We are forced to infer concepts like decision making, response, communication, choices and preferences as well as cellular cognition. This is especially the case when we find the limits of determinism in biology. Chaos theory using the concepts of strange attractors has been used as an attempt to explain phenomenon but it faces a serious contradiction. It tries to see the content as material but it has to explain cognition and concepts as we just stated before.

We already have experience from an immense literature about the problems in resolving the origin of life through chemical pathways alone. Cells possess robust designs and they do not change to another species. Some evolutionists therefore suggested that such differentiation between species must have occurred when the genetic program did not get fixed. However it pushes science in the realm of mere hypothesis with no substantiation. What we do observe is that a variety of species co-exist and there is a web of co-dependent life. All species are codependent and co-existing. Here materialistic explanations find a limit. This means we should again study the philosophical foundations of reality. These include the Kantian and Hegelian foundations in the West and the Vedantic foundations in the East.

4 Limitations of Physics

Several physicists think that we can have a theory of everything in terms of quantum theory and gravity. However not all physicists agree. Kimbal Milton wrote that Julian Schwinger rejected the notions of Grand Unification because he saw them as preposterous speculations based upon the notion that nothing new remains to be found from 1 TeV to 10^{19}GeV [7]. On the other hand he was sure that totally new and unexpected phenomena were waiting just around the corner. He wrote in his book Symbolism of Atomic Measurements that,

"*We send electrons, protons into the various kinds of nucleons, where we perform experiments in which these particles enter a certain very small region. We make no attempt to describe what goes on there and simply try to finally characterize what emerges when the particles are separated again. Is the purpose of theoretical physics to be no more than a cataloging of all the things that can happen when particles interact with each other and separate? Or is it to be an understanding at a deeper level in which there are things that are not directly observable (as the underlying quantized fields are) but in terms of which we shall have a more fundamental understanding?* [8]"

Quantum Mechanics has already highlighted the classical limit in explaining phenomenon. Furthermore it has discovered the measurement problem, where a subjective element must be considered to have entered. We can only predict based upon the present state function describing a phenomenon, the probabilities of different outcomes when an actual measurement is made. How actually these are actualized is another serious problem that has not been explained from a purely objective materialist point of view and is serious contention among the various schools of thought.

Immanuel Kant had laid some of the important foundations of the three limbs of scientific thinking. They are (i) The Causality Principle, (ii) The Substantial Truth and (iii) Logic. They were in general formulated keeping the classical picture in view. With Quantum Mechanics and to some extent due to relativity these have become somewhat restricted in their applicability. QM deals with indeterminism because it states that there are physical measurements whose results are not definitely determined by the state of the system prior to the measurement. The determinism of QM is opposed to the determinism of classical mechanics. There are also non-local correlations are found to exist. An instance of this is given by particles which are separated in space but whose properties are correlated in some way. Furthermore Bell's theorem proved that any hidden variable theory to counter non-local correlations ends up predicting results that contradict quantum mechanics.

Wigner was inclined to subjective theories and often talked about the concept of subjective reduction to explain wave function reduction. There is no fixed point that we can determine at which the wave function is reduced. So Wigner proposed that this reduction takes place when the information reaches our brains. This theory assumes that our mind is of a different nature that the physical world that it is interpreting. Here physics loses its objective relevance in the usual sense. Some philosophers consider the subjective explanations to be the best explanation available at this time. Similarly in the Copenhagen interpretation it is impossible to separate the quantum mechanical systems from their measuring devices. So the wave function referred to the knowledge of the observer rather than the object itself. Thus the object-in-itself remains unknowable in Physics. In many ways a significant section of leading scientists like Schroedinger, Bohr, and others do not adhere to the principle of naïve realism [9].

Einstein was very concerned with the philosophical implications of Quantum Theory. He once told to his friend Otto Stern, *"I have thought a hundred times as much about the quantum problems as I have about general relativity theory"*. Einstein asked a very famous question that do we really believe that the moon exists only if we look at it [10].

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5.0 Vedantic Concept of Reality – Part 1

The Vedantic Conception of reality has been developed by great sages who appeared in India and gradually explained the principle of Reality. Specifically Truth for Itself is the comprehensive truth. And truth for a finite self will always be partial and liable to errors. Therefore consideration of errors has been an important consideration in realizing the actual meaning of the Revealed scriptures. Although there are many commentaries on Vedanta, the emphasis is given to the main teachings given by the four principle Acharyas of Vedanta and that of Sri Chaitanya Mahaprabhu and his followers. [11]

All the main vaishnava acharyas and Sriman Mahaprabhu have explained the meaning of Vedanta by emphasizing on the original texts of Vedanta unlike Sripad Adi Sankaracharya who had to adopt a certain line of thinking by selective picking of only a few of the aphorisms of Vedanta Sutra. For example Sankaracharya translated "*aham brahmasmi*", "*sarvan khalvidam idam Brahmam"* to mean 'I am Brahman' and 'Everything is Brahman'. However the Mahaprabhu explained them as 'I exist and Brahman exists' and 'Everything exists and Brahman also exist. [12]'.We should understand that Brahman is the substantial truth of Reality. Furthermore, all the vaishnava acharyas have proven that Brahman is to be realized not only as the Substantial Truth of Reality but also as the worshippable Original Personality (*adi purusha*).

The epistemology of Vedanta has higher categories than modern approach of science. In Vedanta the ontic states come out from epistemology. Ontology cannot be separated from epistemology. Hence it is our knowledge that shows us the reality. For example before Galileo came everyone thought the earth is fixed and the sun revolves around the earth. But when knowledge changes then modern understanding appeared. In Vedanta there are five levels of Epistemology. The first level is *pratyaksha pramana* which is related to direct sense observations. The second level is called *paroksha jnana* and these are the inferences drawn from the observation of other observers. For example the scientists use data given in journals in their own work. They do not always do their own experiments to record them. The whole of scientific scheme is centered around these levels. The third level is called *aparoksha jnana* which is the knowledge arising from without the external senses. The foundations of this knowledge are the senses pertaining to the self and not the body. When someone meditates one pointedly on some object and eliminates all the external layers of senses, then there is a domain of knowledge belonging to the finite self. In modern mathematics often mathematicians talk about intuition. This can be somewhat closer approximation to *aparoksha jnana*. Often the examples given are that of recollection of the experience of a deep dreamless sleep. When we have a dreamless deep sleep, we can say that the senses did not convey us this knowledge that we had a deep sleep and that some time has passed during sleeping. This is a higher epistemic level pertaining to the finite self. The fourth level is called the *adhoksaja* which means above the ground of the self. It is the knowledge that is submerged above the level of self. The uncontaminated scriptures of the world religions come under the domain of *adhoksaja*. The advice in applying this knowledge scientifically is that one should take the aphorisms from scriptures and apply them practically. And when one can get results then they are scientifically understood. Thus all other forms of knowledge systems must be applied under the adhoksaja level. Then the higher ontic truth comes out. We must understand that there is a difference between Truth for itself and truth for the finite self. Kant distinguished between phenomenon and noumenon or being-in-itself. Kant implied that being-in-itself is unknowable because all that we can know is its appearance, or its being-for-us. But in Vedanta the disciple is not limited to his finite self and he has help from the *adhoksaja* domain. Hence the student comes to know himself as a servant and a participant in knowing. He comes to know the being-in-itself or the noumena or the substantial truth of all reality as the Spirit, or the Original Person, which is called variously in literature as Brahman, AdiPurusha and Bhagavan. The fifth stage of Epistemology is called *aprakrta* or the continuous transcendental life in transcendental nature. It is the domain of pure self dedication and love of Godhead. The major requirement for accessing the higher levels of epistemology is a humble attitude and a serving temperament to receive and apply such knowledge practically. The higher truth is not within the fists of the finite living entities. Yet the infinite is not infinite if the infinite cannot let itself be known by the finite. Then from the logic presented in this section, scientific method also must become open to the wisdom contained in world religions to resolve the difficult problems that it is encountering in determining the foundations/ origination.

6.0 Contradictions becomes acceptable in modern epistemology

Contradiction was not a part of the Aristotelian system due to the logic of the excluded middle [13]. But after the advent of quantum theory contradiction is no longer considered as impossible in the study of objects. Quantum systems require several complementary descriptions. When taken together they appear paradoxical and contradictory. Quantum theory has in this way revealed a new type of logic about the world [14].

However many scientists and philosophers like Bohr, Pauli and Jung believed that the principle of complementarity was far more general than the descriptions of nature of electrons. Complementarity, Bohr felt was basic to human consciousness and the way mind works. Pauli propagated the idea that, "the *issue of complementarity within physics naturally leads beyond the narrow field of physics to analogous conditions of human knowledge*" [15].

This created a shift in logic from the certainties of Aristotelian system. Logic changed from "A thing is either A or not-A" to "both A and not-A." Science today is no longer about creating any exhaustive descriptions of the world in a single map that explains all features. In truth science is producing just a series of maps showing different features and these maps do not quite overlap [13].

7. 0 Complementarity of Quantum Physics extended to Mind and Matter

Due to this complementarity in the epistemic domain, it has been argued by several scientists and philosophers like John Polkinghorne, Pauli and Jung etc. that different aspects including the mental and physical may show a complementarity in quantum physical sense. They became dual aspect monists. For example Atmanspacher

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explained complementarity as, "*Two descriptions are complementary if they mutually exclude each other, yet are both necessary to describe a situation exhaustively.*[14]" Pauli and Jung thought that duality of mental and material aspects, is specified in terms of a complementarity. Bohm also had such ideas. He said, "*At each level of subtlety there will be a "mental pole" and a "physical pole*" [16] and thought that the deeper reality is something beyond either mind or matter.

Pauli said, "*It would be most satisfactory if physics and psyche could be conceived as complementary aspects of the same reality.*" [17] Atmanspacher notes in his paper [15] that the notion of complementarity was coined by James to account for the split modes in consciousness. Later Bohr extended it into physics in terms of wave-particle duality. Further Bohr's main concern was to extend this duality beyond physics. In QM several new issues like incompatibity, incommensurability and incomparability and opposites have become a reality.

One of the very important concerns of modern physics is the measurement problem in Quantum Mechanics. Pauli wrote that, "*It might be that matter, for instance considered from the perspective of life, is not treated \properly" if it is observed as in quantum mechanics, namely totally neglecting the inner state of the \observer*"[18]. In this regard Pauli referred to the incompleteness problem of quantum mechanics. Pauli noted that although Einstein recognized this, his proposition in terms of classical field theory was not sufficient.

Of course nowadays the non-local correlations have been discovered. First by Bell's hypothesis which has been later confirmed by the experimental work of Alain Aspect [15]. It implies that in any system which contains descriptions in terms of non-commutating observables, some non-local correlations will be found. This is taken to indicate that before the act of measurement the measured system is in a holistic state [15]. This also means indirect inference of knowledge of the state of the system prior to measurement due to measurement.

This indicates what Bohr had already explained. Any intervention changes the state of the observed system in a finite and an uncontrollable way [19, due to Bohr in 1935]. But this also means and that Bohr had also explained that local realism is also a necessity for a proper explanation of reality, i.e. experiment and their respective outcomes. It implies we need both local realism as well as non-local correlations for comprehensive explanations of reality.

According to Atmanspacher the process of measurement represents a link between *epistemic states* and *ontic states*. Here ontic states refer to holistic concept of reality in which states are associated with intrinsic properties and are operationally inaccessible. For Atmanspacher, "*Measurement suppresses the connectedness constituting a holistic reality and generates approximately separate local objects constituting a local reality.*" Pauli in this regard referred to Heisenberg's statement, "*As Heisenberg has emphasized, quantum mechanics rests on a sharp cut between observer or instrument of observation on one hand and the system observed on the other.*" [15]

Yet Quantum theory as such does not refer to the mental domain of human observers or to cognitive features in general. This is because the general consideration is that any non-intentional inanimate environment can be understood as a measuring device and no consciousness is necessary for measuring a quantum state. But when we consider issues like controlled experiments, several features come out like experiment design, choices in selection of observables and interpretation of data, all which have dependence on thoughts and intentions of human observers, none of which is a part of the formalism of QM. Even though quantum mechanics infers the subjective element from the problems of measurement, yet it does not deduce consciousness as a product of sub-atomic field interactions. Therefore consciousness is required to explain the measurement process but it does not explain what consciousness is, neither does it explain how it arises. Modern science misses the explanation about the reality of the subjective half of reality. The Logic of Quantum mechanics does not make any final judgment about the Ontology of Truth-for-itself.

8 A more Philosophical approach

It requires a more rational approach to scientifically comprehend the truth of reality which comes about as containing simultaneously the contradictory sides. Sripad Bhakti Madhava Puri Maharaja has mentioned in his website www.gwfhegel.org) [20] that the process involves three stages, viz., (i) The Stage of Abstract Understanding which is abstract determination of the separate sides of the contradiction without understanding the relation between the two sides, (ii) The stage of Negative Reason in which the dialectical relation of the two sides is determined. In this process the existence of the abstract independence of two sides in the stage of Understanding is dissolved and a dialectical relation is reasoned, (iii) Positive Reason: this dialectical relationship is raised into a dynamic reality. The ability to reason in these stages prepares the thoughtful to come to its True Concept.

This means that when we study something we start with being. Then we take the opposites, i.e. being and its negation, i.e. non being and in this process we separate them out from one another. But in this process we are left with something that is already the opposite of itself. Thus in the process of understanding, it is abstracted from its oppositional relation. After that it is posited as if it is something on its own. Thus it becomes the opposite of what it actually is. But in truth it exists as it is only in an oppositional relation.

But if thought removes that relation from itself then what is produced out of it is really something opposed to what it actually is. Thus understanding results in an abstraction. This kind of being is therefore an abstract being and it is therefore a thought which is not yet very well developed. In this way we can realize that there is no such a thing as a being on its own.

When we think like this it is only an abstraction. By itself without this oppositional relation, it is only an isolated idea. For example the idea of 'North' already contains the idea of 'South' implicitly in it as

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an oppositional relationship. On its own North has no meaning. It is only an isolated or abstract being that did not consider its dialectical oppositional relationship with South, which is its non-being. But when these two moments are considered in their unity as an opposing relation it is called becoming. This is the true comprehension of the actual situation. So the same can be said for any opposition if we consider it carefully in this way. An opposition ties one thing with a specific other. So there is a necessary relation involved, that relation has a dynamic structure which thought can uncover and leads to a higher conception that unifies them [21].

In this way by a proper rational approach the body/mind opposition can be comprehended in a higher synthesis or unity called consciousness. The problem is that QM is not really a theory about consciousness. Atomic theory as we understand today concerns itself with waves and particles. It is not really a theory about consciousness. The theory is wrought with much speculation arising from some quarters because of the unnecessary confidence that everything can be explained by it.

9 Vedantic Concept of Reality - Part 2

The Vedantic thought quite clearly establishes that consciousness is not a result of mere chemical activity. Quantum processes will not result in life because it does not produce living activity. Life constitutes a higher order activity in nature. We do not find conscious activity outside life. But we do see that when the living entity dies there is no more consciousness left. In the living form we find the unity between consciousness and matter. This unity exists from the very conception of life in the womb in the form of a zygote. Later the different limbs differentiate and lastly the dead matter remains as a residue after death. Thus the unity of life is this Genus process itself which cannot be reproduced outside this species process.

The idea of the harmony of opposites is well considered in Vedanta. Yet Brahman, or the Absolute Person (*Adi purusha*) is explained as the cause of all causes. Further Absolute is Sentient. Both the *cit* (the infinitesimal conscious energy) and the *acit* (material energy) are His dependent energies. Matter is described as a symbol of undeveloped consciousness. Therefore it is not inconceivable that Matter can come from Life. Or Life follows a higher order of logic (such as free will) than material energy. According to Srimad Bhagavatam, "*No one in the material world is perfect, and an imperfect person could not describe this material universe accurately, even after continued speculation.*" [22]

10 Hegels Organic Whole concept of Life

According to Vedanta, Matter came from Life. Or matter is a symbol of undeveloped consciousness. All our science is a science of material transformations. But it does not apply to life. We have no proof that chemicals ever combined to give life. But we have proof that life comes from life. As Pasteur's experiment proved that life cannot arise spontaneously in the conditions that prevail upon earth today, the abiogenesis theory was put forward as a hypothesis that since the primeval conditions in the earth were assuredly different than today, life might have arisen in those condition. But there is no demonstration of that in any lab experiments all over the world.

Hegel clearly distinguished the logic of life from the logic of mechanism and logic of chemism. Hegel did not hold a vitalistic view of life nor did he think that nature was alive in all its parts [23]. The structure or the logic of life is dependent on life's own inner conceptual necessity. It is not a natural process which is comparable to the chemical processes. Chemical processes cannot give rise to life during the course of evolution of nature. Living beings have their individuality. A living being comes to be and also passes away. But their essence, i.e. their substantial form which is their existence as a determinate genus process or species exhibits the categories of universal (e.g. animal or human), particular (particular species) and individual (a given instantiation of the species, an individual member, say this person or animal).

So many species of life seem to coexist and natural philosophers like Darwin may have conceived that there is a kind of evolution from one species to another. But the problem is that such statement about the history of the organisms is not observed in nature. Even the fossil record and the geological data are contradictory to the concept of gradual evolution and there is no link that connects the species to some universal ancestral species. The evidence presents the species variety as a web of all life in which all species participate and exist simultaneously, by co-existing and co-depending on each other for their survival and needs. Hegel writes, "Life is essentially organism. In the organism the form is this unity, and at the same time these parts of the form are not parts but members [Glieder], they are ideal." [24]

We cannot call the chemical parts of a chemical unity as members. But in case of life, the limbs are the members of the unity of the living form. The form of the living organism is always instantiated strictly within the species process of nature or organic life as an individual strictly within the boundaries of the species. The chemical parts can be separated and reunited by appropriate chemical processes. For example we can separate Na^+ and Cl^- ions in NaCl by the process of electrolysis. But if we hold a chemical view of living organism and do the same to them (separate the chemical constituents) then it will lead to death. We will not be able to come back to the organic unity of the living process, which is lost in the reductive process. Hence the organic unity of life is based upon its life process or its genus process, which is governed by its inner conceptual necessity. And the study of this inner necessity must be the objective of the study of Science of life. Therefore Hegel used the terminology member rather than parts for the different limbs and organelles of living organism. These members are produced by the inner conceptual necessity of the living process itself and therefore the chemical process will never be able to produce even a single blade of grass. Kant had expressed this quite succinctly when he said, "*There will never be a Newton for the blade of grass* [25]." Therefore even the insignificant blade of grass is teaching the scientists the lesson of humility.

The members of the living organism (say, the root, stem, leaves, fruit and the seed) are mutually co dependent and co producing members of the one whole. We will not be able to make the logic any simpler. For example the acorn is necessary to produce the Oak tree and the

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Oak tree is necessary to produce the seed. In modern cellular biology, this circularity in causation is observed and substantiated. For example DNA requires RNA and the cellular extra-genomic material for producing the necessary functions and structures. Therefore the information in the cellular process is contained in the whole cell itself and when DNA is abstracted there is no more any information. The reductionistic thinking finds its limit in modern cellular biology. The structure of biological causality is circular. The effect is the cause of the cause. This logic process of the living phenomenon necessitates proper ontologically wholistic thinking in nature. Therefore the parts (members) are mutually related as co-dependent and co-producing moments of the whole. The cause of the integration of the members is therefore to be located in the unity of their common purpose which is coming from the life principle wholistically and it is not a mechanism or mere chemistry. This proves the Vedantic Axiom for the Origin of Life, i.e. *Life comes from Life*. The Organic whole thinking of Hegel finds a parallel in the Vedantic thought as well. The whole comes from a whole. Or the complete comes from the complete. This is also the foundation of the Vedantic thinking about life, Universe and Reality. However this unity of the living process is negative or it is a self-related negative unity. Therefore consciousness is negative. It is not the positive.

11 Conclusions

Naïve realism, which posits that objects exist independent of their observation has been found to be a limited concept. Quantum Physics disproves theories of local realism. The objects cannot be thought of as existing independently of the observer. This is also the conclusion of Vedanta. The Vedantic understanding is that matter comes from life. This principle should be experimentally verified and it will open new light on the question of origin of life and origin of matter. Life is a higher category and cannot be produced from matter. A practical approach to understanding the Vedantic concept will be to take the principles in the form of the two empirically verifiable axioms, viz. (1) Life comes from Life, and (2) Matter comes from Life. This summarizes the entire vedantic teachings in a scientific form. Thus Vedantic truth is in agreement with those scientists who from the development of Quantum Physics think that there is a subjective element to the objective reality.

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Plenary Talk 3:

CARTESIAN MIND-BODY DUALISM AND VEDANTIC RESPONSE

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Introduction

The history of humankind reveals a constant recurrence of some fundamental problems which have agitated human mind right from the dawn of human civilization. One of such perennial problems is the nature of Reality. The demand for some kind of universally acceptable conception of Reality is one which human mind cannot help making. But no two human minds have ever agreed in their pronouncements.

To undergo experiences is a feature common to all living beings. But **Nature** has endowed human being with the unique capacity to heighten, deepen and widen experiences and also to reflect upon them. It is a prerogative of human being to retain them, to ratiocinate about them, to discriminate among them, and to articulate all these in clear, distinct and logical terms. Conceptualization and verbalization of experiences provide human beings with immense empowerment. A human being who possesses reflective awareness can exercise rational ability to regulate experiences by manipulating innate endowments and external surroundings after examining the veracity, utility and significance of his/her experiences. Human cognitive and reflective potentiality is tremendous and unfathomable. It is wondrous and variegated. It admits of expansion, manipulation, regulation and systematization. It would be sheer wastage of human potentiality if such an exercise is not undertaken. The Vedic seers describe human as offspring of the Infinite and enjoin to utilize our potentialities for betterment and excellence of life.

Reflection thus springs from experience; it is embedded in experience and gets its culmination in experience. It begins from experience and ends in experience. It is rooted in experience and is tied down to experience. To be meaningful and useful it has to confine itself to the arena of experiences alone. Experience is the only gateway to Reality, knowledge, values and their realization. They are apprehended in experience and there is no other way or means to have access to them. They are amenable to experience and genuine experience must pertain to them. To experience is to experience the real. An unreal is never experienced but only imagined or hypostatized and superimposed. Human mind has this capacity of abstraction, computation and superimposition. It can also discriminate between the real and unreal, the experienced and the mentally construed. Of course, the construed also has its significance, value and utility. It is given status of knowledge in a different context as *uha*. It is sometimes called speculation. A speculative enterprise begins from experience but it gets entangled in the labyrinth of imagination and becomes removed from Reality. It has importance but its role is ancillary and subservient to experience. So long as it helps experience in revealing the depths and subtlety of Reality it has meaning value and utility.

Metaphysics is consideration of what is involved in the facts of experience. The most striking phenomenon revealed in experience is the existence of a very complicated multiplicity of conscious individual beings with body, senses, mind, intellect and spirit which animates all these and this apart the wide and varied external world which seems to be material. We experience the two as internal and external existences or as subject and object. Though the two are given to us in our veridical experiences and their existence cannot be normally doubted and denied their nature has been an occasion of much speculation and sometimes skepticism. There has been plethora of thought and literature both in the west and in the east on this.

Western scenario

In the west in the Greek period Pythagoras, Plato and Aristotle and many others offered their considered views on this subject. During medieval period Aquinas and other scholastic thinkers ventured into this problem. But from Descartes onward it acquired central focus and this trend continues even in modern times. Descartes initiated what is known as Cartesian dualism of which many responses and reactions issued forth. The rationalists, the empiricists, the reductionist, the mechanists, the idealists, the neutralists and many others jumped in the field. Theories of interactionism, parallelism, occasionalism, pre-established harmony, reductionism etc. were advanced. Views like ' ghost in a machine' or emphasis on personal identity etc were put forth. Substance dualism, property dualism, predicate dualism etc. arose as responses to Descartes. Different types of mechanistic-reductionist solutions were put forth. There is enormous literature in the field which is quite baffling.

Cartesian Dualism

Descartes started with mind-body dualism on the ground of what he claimed as '"clear and distinct idea". He regarded mind as thinking, non-extended, indivisible substance. The other independent substance is matter or body which is extended, non-thinking and divisible. Both are of different natures and irreducible to each other. There is 'real distinction' between the two. The two can exist on their own, one without the other. However, he was insistent that the two do causally

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interact. But the million dollar question is, what the basis for his absolute certainty is. He may rely on God's will or on reason but what is the evidence for this? This apart his transition from 'reasoning' to 'existence' is groundless.

This Cartesian dichotomy raised a number of issues and responses. Descartes was aware of some of these problems as his correspondence with Gassendi and Elizabeth reveals. He was not serious in answering them and tried to evade them except saying that the two meet in pineal gland. But this was a 'category mistake' he committed. He should have admitted that either the two do not interact or such interaction does not violate causal principle.

Anyway, though he was honoured as 'Father of Modern European Philosophy' he failed in many respects. His analysis of matter gave rise to physicalism and material reductionism but it was challenged by advocates of teleology. His view of matter as infinitely divisible was thrown overboard by quantum mechanics. Malebranche, Spinoza and Leibnitz rejected the idea of causal interaction advocating occasionalism, parallelism and pre-established harmony respectively. Some thinkers like Hume tried to argue that mind is not substantial but a 'bundle of impressions'. Some suggested that mind and matter are incomplete substances by themselves and their union makes them complete. Some talked of neutral monism. The problem initiated by Greek thinkers and augmented by Descartes gave rise to baffling brain storming literature and every conjecture gave rise to more insurmountable issues. One of the offshoots of this controversy is the debate about the nature and status of consciousness with which we shall have an occasion to deal with. Some writers took shelter under the excuse that these are perennial issues. The root cause of the difficulty is the dichotomous and compartmentalized approach of the west.

Indian scenario

In India also we find variety of views right from the times of the Vedas. Different schools and sub-schools offered their well-knit thought systems. There have been intense discussions and debates among these schools and a vast literature is available. The dominant note of Indian philosophical thought has been Vedanta which is most popular among the literates and non-literates alike. It is both a view of Reality and a way of life.

One explanatory remark will be helpful here. In the west no distinction is drawn between mind and soul, though some thinkers have made distinction between mind and brain. But in India a clear distinction is made among body, senses, vital breaths, mind, intellect and self. In Indian literature there are many words which are used for individual self as synonyms and interchangeable. Though strictly speaking they doo not have the same connotation and there are subtle nuances of meaning associated with each of them but in a loose sense no distinction is drawn among them. Such words are atman, jiva, purusha, cit, cetana, bhuta, prana, pudgala, sattva etc. Self is the principle of consciousness and animation. Except self all others are regarded as physical or quasi- physical. All these are distinguished on the basis of their properties and functions. All are treated as distinguishable but not separable. This is because Indian approach is holistic and integral.

The external world is regarded as material, ephemeral and transitory. It has intrinsic worth and instrumental value. It provides the arena for living beings. And in this sense it is valuable. It is to be approached with awe, reverence and gratitude. It evolves from proto stuff (and there are different accounts of its nature) at different levels and forms. There seems to be no acceptance of creationism in Indian thought though a distinction is drawn among material, efficient and instrumental causes. The universe evolves from its causal stuff. We need not presently go into the theories of cosmogony and cosmology propounded hare. Our concern here is to discuss the existence, nature and ontological status of individual self.

Existence of self

It is tacitly believed that the existence of one's own self is immediately experienced, directly felt and intuitively realized. There is no scope or possibility of its denial. As Shri Shankaracharya has very pertinently said, whosoever denies its existence he or she is himself or herself the evidence of its existence (Ya eva hi asya nirakarta tadeva tasya svarupam.) Nobody can say "I am not" or "I do not exist" as this is self- contradictory. So, if one says "I am" it is self-evident. The fact is that the existence of self is undeniable. It is not only given to us in experience; it is also supported by reason and inherited by us through cultural tradition. The mode of our thinking and linguistic usages of "I" and "We" as self-referential words are real evidences of its existence.

Further, one cannot ask for the mode of its knowing as the Upanisads contend that the self itself is the knower and cannot be turned into the known object (Vijanata kena are vijaniyat). It is self–luminous and makes others illumined. (Tasya bhasa sarvamidam vibhati). It makes the instrument of knowing animated. If the self were not there the intellect and mind, the senses and body could not function.

The existence of other selves is inferentially known. But both are regarded as equally real and valuable. There are gradations among the living beings and human being is regarded as the highest *evolute so far*. Human being is characterized by self- consciousness and self-awareness. It is self- identical being. It is distinguishable but not separable from others. In fact in Indian thought there is no 'external other'. The other is organically related with the rest. It is exhorted by seers that to regard the other as external (para) and one's own self as unrelated (nija) is mean mentality to be discarded. In fact Indian thought goes a step further to opine that there is fundamental unity among all existences in spite of differences of nature and function. The Reality is both centrifugal and centripetal. There is identity-in-difference and it is a unique way of understanding the Reality which defies all logical dichotomies. It is only intuitively felt or experienced.

Nature of individual self

Though it is not logically possible to deny the existence of individual self, its nature may be viewed differently from different metaphysical and ontological perspectives. The Vedic seers declared that there can be alternative approaches to perceive, to conceive and to express the

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nature of Reality. There should be samvada and not vivada about this. However, there seems to be unanimity in regarding self as a living being meaning thereby as having consciousness, whatever be the ontological status of consciousness. It is not inert or unconscious. It is life-giving and animating element which enlivens matter in the form of live body etc. It may be spiritual and immaterial from one perspective and psycho-physical from another perspective (cf. Charvaka, Buddhism etc.).

From logical point of view all schools of philosophical thought in India can be classified under two heads, viz., those which regard self as simple and therefore indestructible and immortal and those which regard it as composite and or a conglomeration to be disintegrated.

Some schools identify self with body (dehatmavada), some with senses (indriyatmavada), some with vital breaths (pranatmavada) and some with mind (manatmavada) and all these are partially true. All these can be accepted in their specific context.

Buddhist view of self is known as anatmavada.The general Buddhist position is that the self is a continuous flow of the conglomeration of the series of five psycho-physical elements known as *pancaskandhas.* There are two key Buddhist terms, viz, *samghata* and *santana* which explain the Buddhist notion of self. The five elements are *rupa, vedana, samskara, vijnana* and *nama.* Of these the first alone is physical and the rest are psychical. These five constitute a conglomeration (*samghata*) which is in constant flux in which the preceding gives rise to the succeeding (*santana*). This process does not stop with the death of the body and continues in the next births till attainment of *nirvana.*

The Nyaya-Vaisesika system differentiates between pure self and self in embodied state. The pure self is a simple, permanent, ubiquitous, spiritual substance. Only in embodied state it acquires qualities like consciousness etc. The self is potentially knower (*jnata*), doer (*karta*) and enjoyer (*bhokta*). This is possible when the self is in contact (*sannikarsa*) with mind, senses and body which are different from the self. This system believes in multiplicity of selves, each self having its own body, mind and other individualizing elements. Because of multiplicity social life is possible. According to the Nyaya-Vaisesika tradition, the self is different from body, senses and mind. That it is different from the body is proved by the fact that the self remains the same in spite of the changes in the body and we feel no diminution of self even if parts of body such as legs or arms are cut off. Moreover, awareness like 'my body' or 'my hand' proves their separateness. The self is not identical with the senses, and this is proved by the fact that the deprivation in any sense-organ does not injure the self. Further, the multiplicity of senses would imply multiplicity of selves in the same body, and also multiplicity of experiences would not result in identity of consciousness. The self is different from the mind also because mind, being atomic, is incapable of simultaneously apprehending many objects.

The Mimamsakas seem to be in broad agreement with the Nyaya-Vaisesika thinkers regarding the nature of the self. They generally use the term *purusa* for it. According to them it is a spiritual substance which is eternal, omnipresent and simple without parts. It is imperishable and everlasting. It is knower, doer and enjoyer.

The Jain system presents a syncretic view of self in so far as it has some commonality with all other systems. The self is essentially a sentient being. Life and consciousness are its essential attributes. In itself it is non-corporeal, living, eternal and everlasting substance. It has been described from the aspects of *dravya* (substance), *guna* or *bhava* (quality), *kala* (time) and *ksetra* (locus) in the Jaina literature. Therefore different views about self can be coordinated in a harmonious system. This is the peculiarity of the Jain view and also its strength. It is in accordance with its theories of *anekantavada, nayavada* and *syadvada* and with tripartite distinction of real as *dravya, guna* and *paryaya.*

The self has the capacity of knowing, doing and experiencing. Consciousness (*upayoga*) is its essence. Though different from the body only in association with the body it can realize its capacities. The inherent capacity of every self is alike but in their manifestations there is a difference depending upon its *purusartha* (efforts) and other factors. Not only selves are mutually dependent (*upagraha*), self and matter are also mutually dependent.

The Samkhya system does not accept substance-attribute distinction. It maintains that reality is two-fold. It is consciousness named as *purusa* and matter named as *prakrti.* Both are independent and unassociated substances. The self is unborn, eternal, immutable and immortal substance. It is a unitary and self-identical being. It a subject of all experiences in the sense that it makes experiences possible, but it transcends all experiences. It is the *adhisthata* (supervisor) of experiences. With the instrumentality of the evolutes of prakrti experiences take place. It is inactive and therefore not a doer or agent of action. It is different from ego, a product of matter, which individualizes consciousness. It appears like Cartesian dualism but it is not so as it talks of some commonality between purusha and prakrti.

The Vedantic conception is generally accepted by the masses and is the dominant view in Indian culture. It may be due to the influences of Ramayana, Mahabharata, Puranas and Dharmasastras. The Vedantic view is based upon the Upanisads, the Brahmasutras and the Bhagvadgita recognized as *prasthanatraya.* But there have been varied interpretations of these texts and therefore there are many strands of Vedantic thought both classical and modern. Two most prominent and philosophically significant views pertain to Samkara's absolutistic Vedanta (known as Advaita) and non-absolutistic Vedanta of some other thinkers.

In the Upanisads which are foundations of Vedanta sometimes the words Brahman and *atman* are used as synonyms. Where a difference is drawn *atman* stands for individual self and the word Brahman denotes the total reality. The more common word for individual self is *jiva.* The word *purusa* is sometimes used for the Supreme Self and sometimes for the individual self. Only from the context one has to make out the meaning.

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(a) Advaitic view

According to Advaita Vedanta the individual self is the same as the Absolute in the ultimate analysis. Only due to *avidya* it appears to be individuated and differentiated. Then it is experienced as *jiva*, having psycho-physical conditionings. In itself it is pure consciousness, a witnessing consciousness (*saksi*) having superimposed adjuncts like *antahkarana* (which is four-fold as *mana, buddhi, ahamkara* and *citta),* body etc. It is pure subject which cannot be objectified. It is self-luminous pure consciousness which is trans-empirical. It is infinite, *sui generis*, formless and quality-less existence. It is unalloyed bliss. It is eternal, immutable, immortal and eternally free. In this sense it is one with Brahman. In the form of *jiva* it is embodied having mind, senses and different forms of body like gross, subtle and causal. *Jiva* stands for *anupravesa* of consciousness in the limiting adjuncts. It is then finite. Otherwise *jiva* is the same as Brahman. The difference is due to *upadhis* and with the dissipation of *upadhis* non-difference is experienced.

As *jiva* the individual self is *jnata(* knower*),* *karta(*doer*)* and *bhokta(*enjoyer*)*. It leads a sense-bound empirical life and it is subject to pleasure and pain. It fabricates its own *samsara* and is enmeshed in the series of life and death. In the process of transmigration it is repeatedly born and it dies again and again under the force of *karmas* and this process comes to end when there is *mukti*. An embodied self is atomic in size but it is really infinite. Likewise empirical selves are many but the real self is one only. Empirically speaking again the self has five *kosas*, viz., *annamaya*, *pranamaya, manomaya, vijnanamaya* and *anandamaya*, and it has three states of existence, viz., *jagrata, svapna* and *susupta*. The real self is *ananda* and *turiya* or *turiyatita.*

Thus in Advaita Vedanta the real self is regarded as eternal, infinite, indivisible, self-luminous, undifferentiated and unitary *saccidanada* (Being-Consciousness-Bliss). In mundane state only it has different nature which is superimposed on it but which does not affect it in real sense.

According to the Advaita Vedanta Brahman alone is the Supreme Reality. All the finite selves are nothing but the appearances of Brahman. The relation between the individual self and Brahman can, therefore, be that of absolute identify. Strictly speaking we cannot talk of any such relation, because in reality they are not different. All the individual selves are one and the same indivisible Brahman, but owing to the particular adjuncts caused by *avidya* the one unitary Brahman appears, as it were, to be multiplied into multiplicity of individual selves. What is real in each self is the universal Brahman. The whole aggregate of individualizing bodily organs and mental functions, which in our ordinary experience separates and distinguishes one self from the other, is the off-spring of *avidya*, and as such is unreal.

The individual self, which is manifestly in bondage, is unable to look through and beyond *maya* which like a veil hides from it its true nature. Instead of recognizing itself to be Brahman, it blindly identifies itself with its adjuncts which are the fictitious off-springs of *avidya*. The self which in reality is pure intelligence, non-active, infinite etc. thus becomes as it were limited in extent, knowledge and power. It further becomes an agent and an enjoyer. It is only when the adjuncts are removed by the right knowledge of its true nature, which consists of the fact that it is in no way different from the Highest Self, that final emancipation takes place. Then it shines in its original nature which amounts to annihilation of its finite existence and finite nature.

(b) Disagreement with Advaitic view

Non-absolutistic thinkers do not fully agree with Advaitic view, and declare that the individual self is the most palpable and concrete entity. Its reality is given in the facts of consciousness, for consciousness which is ever-changing requires a substratum. It is also given in the facts of memory and recognition, for recognition implies a conscious subject persisting from the earlier to the later moment. It is also implicit in inference, for it presupposes the ascertainment and remembrance of general propositions. They supplement these empirical arguments with the testimony of the scriptures in which the plurality of self is explicitly recognized.

It is said that the texts like 'Tattvamasi'('Thou art that') teach the absolute identity of the individual self and the Supreme Self but they reply that these texts are not meant to convey the idea of the absolute unity of non-differentiated substance. On the contrary, they denote a Brahman qualified by difference. The word 'that' refers to Brahman and the word 'thou' which stands in coordination to 'that' conveys the idea of Brahman in so far as having for Its body the individual selves. According to them each individual self is a real self-identical being. It is a spiritual being different from the material elements like mind, body, vital breathes, senses etc. They hold that the essential nature of the individual self is to be a knowing subject. It is not pure consciousness as the Advaitin maintains, but it is the substratum of consciousness. It is not mere knowledge but an individual who possesses knowledge as its essential characteristic. That the self is a conscious principle and not mere consciousness is emphasized by them in order to safeguard the individuality of the self against the Advaitic tendency of overlooking all distinctions between the finite self and Brahman.

They further maintain that the individual self is not only a knower, but also a doer and is thus a true self characterized by thought and activity. Though the self is an agent, this does not mean that it is always active. It is provided with the capacity to act but it may act or may not act, as it pleases.

They further maintain that the individual self is eternal and immutable in the sense that it is *sui generis* and has its own intrinsic value. It is unborn and immortal. It is real, and the real, as the Gita declares, never ceases to be. Therefore no dissipation of the individuality of the self can be admitted. When the scriptures speak of origination and destruction of the self they only point out the association with and dissociation from the body of the embodied self. But in all these births and deaths and rebirths, which continue up to release, there is no addition to or diminution of its essence and existence. Those texts which deny origination mean to say that the self does not undergo changes of essential nature.

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Individual self as conscious being

One of the most striking phenemenon revealed in human experience is the indubitable and inevitable availability of consciousness. Of course we are sure of our own conscious existence and say "I exist" and make a contrast with inanimate objects by saying "I am living being and they are not" or " I experience" or "I am conscious" etc. We are also aware of other conscious existences inferentially and say "They are also living beings". The point is that existence of consciousness is most intimately felt, whatever be the form of its nature and mode of its experience. All achievements of culture and civilization, all domains of cognition, volition, affection and conation are its manifestations. Its expressions are varied and wonderous. But in spite of all these precise understanding of its nature and modes of functioning has been enigmatic, problematic and elusive to a rational mind.

A study of consciousness is a reflective awareness of a human being. It is an awareness of awareness, a meta-awareness through ratiocinative and discursive reasoning. To a discursive mind it is to be approached and investigated in a phenomenological reduction or through brain dissection or through laboratory experimentation. Though lively and interesting, it is highly complex and perplexing and defies all these approaches. It is at once a matter of certainty, wonder, doubt and denial. Nevertheless it is a marvelous phenomenon inviting and absorbing more so since it pertains to one's own self.

However, to a spiritually enlightened person it is most intimately experienced, intuitively apprehended and immediately given. Consciousness is only to be experienced and it cannot be reasoned or expressed in language. It cannot be an object of thought or of laboratory experiment.

Now the question is, we experience both matter and consciousness but which one is primary and which one is derivative or both are primary or both come from some higher source. Both cannot be primary as the dualistic hypothesis is fraught with many problems and has not been successful so far in pointing out the relation between the two. In the history of western thought we have witnessed many such abortive attempts from Descartes onwards till modern times. But the fact remains that matter and consciousness do co-exist in organic unity in living beings. It is consciousness which animates the inert matter and controls it as well. So the reductionist hypothesis of regarding matter to be primary and consciousness as its epiphenomenon becomes untenable. Physical sciences have tried hard to prove this hypothesis but have failed so far. To regard both as derivative from such higher source will lead to the fallacy of infinite regress. But the law of parsimony would make us believe that consciousness may be regarded as the sui generis highest principle. This position is strengthened by the fact that matter does not beget matter but consciousness begets consciousness. Reproduction is the sole prerogative of consciousness. Matter can be conjoined and disjoined but this is not reproduction. On the other hand one life produces another life. Matter is not self-revealing but consciousness has this property. Matter mutates but consciousness can only be concealed and enveloped. Matter can be splitted up but consciousness cannot be done so. A comparative survey of the properties of the two would reveal that consciousness has some such properties which provide it primacy. Somehow a behaviouristic mind may not agree to this point.

The pursuits of science have so far resulted in skepticism, or probability or uncertainty. In the realm of spirituality on the contrary there is absolute certainty. This provides succor and solace, peace and beatitude which every living being aspires.

In Indian cultural tradition a clear distinction is drawn between two levels of Reality, knowledge and values. One is empirical and the other is trans-empirical. The empirical is multiple and the trans-empirical is unitary. The empirical is phenomenal and the trans – empirical is transcendental. The former is amenable to sense experience but the latter is beyond the ken of senses and mind and is to be experienced intuitively only. The former is the realm of matter and the latter is the sphere of consciousness. The former provides the stepping stone to transcend to the latter. The two constitute the base and the apex. The material world is the base and has initial significance and value. But it is ephemeral and mutates. It cannot be final. Only consciousness is experienced as permanent. This has been aptly analyzed in the Mandukya upanishad in terms of four states of existence and in the Taittiriya upanishad in terms of five sheaths covering the Real. These are well known views and need not be discussed here.

Any approach to Reality has to be holistic and should not be partite to understand it fully in its entirety. For this purpose inner experience which is immediately and intimately realized should be relied upon. It is free from conditioning and limiting influences of senses, mind, language and external surroundings. This is the realm of spirituality which is available in yogic state of equipoise. Different from this is the outer experience which is mediated by several factors like object, circumstances, subjective limitations etc. That is why it is partial, and sometimes faulty and deceptive. It is contingent and conditional and therefore stands in need of verification. This is the area of empirical science. Both spiritual experiences and verdicts of science are valuable in their respective spheres and must be resorted to with judicious discrimination. As stated earlier, there are two levels of Reality-- the immutable and mutable, the permanent and changing, the eternal and ephemeral. In a holistic approach both need to be attended to. So science and spirituality have to join hands together. Just as pursuit of science presupposes certain training and skill, so also, spiritual experience requires practice of sadhana, rigorous discipline and deep meditation.

The above stated approach alone can solve the riddle and controversy between science and spirituality. This is the message of Ishavasyopanishad, Kathopanishad and Mundakopanishad. It is hoped that this ancient wisdom will dawn upon us and resolve the tangle for the benefit of whole humanity and the cosmos.

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Plenary Talk 4:

Action Research: A Methodology for Inquiring into Subjective Experience

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Abstract

The main aim of this paper is to argue that, if we are to generate knowledge about all aspects of what it means to be human, we need to expand our range of methodologies to include those which accept subjective experiences as valid data. Classical science has traditionally excluded the subjective perceptions of the scientist, as they have been viewed as less reliable sources of information than those which exist in the external world. However classical science is based on an ontological view that matter is the primary 'stuff' of the universe, and that all forms of life, including what we as human beings experience as consciousness, have emerged from matter. What is less commonly recognised is that scientists and philosophers have failed to prove the ontological context in which we live our lives. Given available evidence, it is equally possible that matter is an emergent property of a deeper primordial reality. We now need to expand science by creating a new epistemology and methodology, which allow intersubjective inquiry into the nature and sources of our internal as well as our external worlds. Drawing on the work of William James, Kurt Lewin, Carl Jung, P.W. Martin, and John Heron, I propose an action research approach to such an inquiry, which promotes a cyclical process of action and reflection, and recognises all forms of experience as legitimate data. It also identifies different ways of knowing, and provides a framework for generating evidence about what it means to be human based on intersubjectively agreed criteria and findings. Ultimately, I am proposing a way forward that will allow us, as a research community, to investigate the hypothesis that our lives have a significance beyond our current human embodied existence, and to identify methods we can use to explore what that significance might be.

Introduction

The starting point of this paper is that, in the western world at least, we have been socialised into believing that the physical sciences have provided the most successful and reliable methods for generating knowledge about the universe in which we live, and about ourselves as human beings inhabiting this universe. My argument is that this contention is deeply flawed, and that it relies on assumptions that are often implicit, but when made explicit are found to be unprovable. However, the consequence of holding such a belief is that we close down on other explanations of what it means to be human if they are not legitimated by science. At the same time, we are increasingly becoming ensnared in a trap of our own making: we find ourselves in a world where human suffering is on the increase, violence exists in many forms across the globe, extreme poverty is sustained with a growing gap between the rich and the poor, there is an escalation of environmental threats, and mental health problems are a growing public health concern (web link 1). It seems reasonable to ask, as Noam Chomsky does, whether we are on the verge of total self-destruction? (web link 2)

In these circumstances, given that, despite huge technological progress, classical science is not providing us with the knowledge we need to address these extreme challenges to our mental and physical wellbeing, is it not time that we revisited both the assumptions and methods of science? Should we not radically re-evaluate its ability to create the kind of knowledge we require to deal with the extensive range of local and global problems?

In this paper I engage in that evaluation, suggesting that we need to challenge both the ontology and epistemology of the physical sciences. Classical science is based on the ontological belief that the universe ultimately consists of matter, and that all subjective experiences, contained withinour experience of consciousness, is an emergent property of the physical brain. Further, the assumption is that theresearcher exists independently of that which he is researching, with laws inbuilt into the universe which determine what happens, and when discovered, allow for generalisation and predictability. This leads into an epistemology which says that it is possible to studyand gain knowledge about aspects of the world as though they were external 'objects', whose behaviour is not influenced by the researcher's presence. Methods of investigation are then applied based on the belief that it is possible to observe, control and quantify all forms of interaction between the separable, component parts that make up the world.

I propose that we expand our meaning of science in a way that allows us to explore the possibility that matter does not constitute the foundation of reality, but that it may instead be an emergent property of a deeper primary reality. Further, it is possible that our subjective experience of consciousness is not dependent on matter for its existence, and may continue in a different form beyond human life. In this paper, I contend

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that it is not adequate to discuss these different possibilities, using only theoretical propositions, experimentation using control groups, generalised abstractions and personal beliefs as the basis for the debate. We now need to expand science by creating new methodologies that allow for intersubjective inquiry and investigation into the nature and sources of our internal world, explicitly contesting the materialist ontology that has historically but mistakenly judged such inquiry to be invalid.

One way of doing this is to develop methodologies that recognise and honour the inner experiences of individuals, and aim to understand the nature of the relationship between what goes on in person's inner world (for example, their feelings, emotions, thoughts, intuitions, desires) and their external world (the physical environment to which we all have access through our five senses).

Action Research: a methodology for researching inner and outer worlds

By the beginning of the 20th century, the belief that science could provide the means to true knowledge was well established. There was an acceptance of the scientific method, which consisted of observing some aspect of the physical world, formulating a hypothesis, creating and testing predictions, and developing generalisable theories based on findings. Because of the assumed primacy of the material world, and the view that all subjective experiences were emergent properties of the brain, there was in the physical sciences a disregard for the internal world of human beings, and a conviction that all behaviour could be understood through the analysis of observable phenomena.

However, there were philosophers, psychologists and other major thinkers who were promoting different perspectives. William James (1842-1910), an American philosopher and psychologist, considered that whatever a person experienced was worthy of investigation, and internal processes were valid sources of knowledge. He created the concept of 'radical empiricism' (James 1912), by which he meant that in research, nothing should be included which was not directly experienced; nor anything excluded which was directly experienced. Sense perception on its own was not sufficient. In his view, consciousness was not dependent on matter for its existence:

> The essential problem for James was that there cannot be a science of any kind without some consciousness to name and interpret it. Objective realities always exist not as independent entities, but as a function of something else.
> (Taylor 1994: 353)

He claimed that radical empiricism was a way of knowing the world that dealt with the whole of experience, whether generated from within the person or outside. Thus, everything within the whole sphere of human experience was potentially open to investigation.

John Dewey (1859-1952), also an American philosopher and psychologistwho was influenced in his thinking by William James, rejected a dualist epistemology. He did not believe that inquiry should be seen as the mind observing and drawing conclusions about the world as though it had an objective existence. Rather, he saw inquiry as a process which was grounded in experience, and included all aspects of that experience. For example, if there appeared to be a problem in human action, he would establish a hypothesis about the nature of that problem, proceed to engage in behaviour that tested out the hypothesis, and evaluate its validity according to whether the problem was resolved, and the human actionbeing studiedcould now successfully progress (Dewey, 1929).

Herein lies the origins of action research, a term reputed to have been invented by Kurt Lewin in the 1940s. Lewin believed that action research was a form of inquirywhich involved action, reflection on that action, and collaborative discussion, in a continuing cyclical process whereby ordinary people could participate in collective inquiry into any aspect of their life experience. 'No action without research; no research without action', he concluded (cited in Adelman 1993:8).

Lewin's main concern was in helping people learn 'how to develop social relations of groups and between groups to sustain communication and co-operation', with a particular emphasis on enabling minority groups to gain equality through action research (Adelman 1993:7). So, although as with James and Dewey, he challenged the view that the objective world existed independently of the subjective world, he saw it as perfectly acceptable that research could focus on action, and that gaining knowledge about how to improve the quality of people's lives was a valid form of inquiry. He did not, though, focus specifically on the nature of people's internal worlds, and the complex relationship between inner and outer realities.

However, since Lewin, others have taken his concept of action research, and applied it to an exploration of inner worlds. One early proponent of this was P.W. Martin(1893-1972), a depth psychologist who was strongly influenced by the work of Carl Jung (1875-1961) a Swiss psychiatrist and psychoanalyst.

Jung, in his psychotherapy practice, had built on the work of Sigmund Freud (1856-1939) in developing his theory of the unconscious. Jung was in complete accord with Freud in relation to the immense importance of the unconscious. However, he went far beyond Freud in developing his understanding of what this was, by introducing into it a spiritual dimension. Freud considered that the unconscious held materials that had their origins in conscious awareness, but which were then repressed because the individual for some reason could not tolerate them. Jung believed that, not only did we have a personal unconscious which contained our individualised store of experiences – but there was

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also a collective unconscious which was a repository for universally shared symbols and memories. He introduced the concept of the *Unus Mundus,* which he described as:

> The potential world of the first day of creation, when nothing was yet 'in actu', i.e. divided into two and many, but was still one .... A potential world, the eternal Ground of all empirical being, just as the self is the ground and origin of the individual personality past, present, and future.(1963: 534)

A major interest of Jung was to understand the relationship between the conscious and unconscious, so that the two could work together for mutual benefit. Originally, Jung developed his work with people who were suffering some kind of mental illness. However, he discovered that his approach was useful, not only in this context, but as a means of inquiry into the nature of life. He found that:

> Insofar as consciousness took a co-operative attitude towards the unconscious, the unconscious itself grew increasingly co-operative. (ibid: 8)

Jung believed that 'normal' men and women, provided they were prepared to take the trouble and run the risks, could also experience this flow of life-enhancing energy. As a consequence, they underwent a profound change in values and outlook. In other words, this source of new energy was not a psychological antibody, produced by the psyche to tackle neuroses. Rather, it could potentially be an integral part of normal life, which at present was paid virtually no attention.

Jung developed a practice which he termed the 'constructive technique'; that is, methods of encouraging the unconscious to reveal what was going on in an externally expressed form, through a process of 'withdrawal' wherby they accessed the deeper part of themselves, and the 'return' when they brought back the learning gained into their daily lives.

Building on Jung's work, and in particular exploring the significance of the constructive technique, Martin reflected on what people encounteredwhen they accessed their unconscious through the process of withdrawal. He believed that what they contact is their 'deep centre'. This he described as a sense of connection with:

> something lying beyond the ego-consciousness but which nevertheless affects consciousness. And the effect of the deep centre is to transform, integrate, re-create the human being who finds and holds to it. (1955: 133)

He saw others trying to achieve something similar: for example, T.S. Eliot as struggling in his own way to find the creative activity operating the other side of consciousness, the life-bringing symbol floating up from the unknown. Eliot wrote:

> I said to my soul, be still, and wait without hope
> For hope would be hope for the wrong thing; wait without love
> For love would be love of the wrong things; there is yet faith
> But the faith and the love and the hope are all in the waiting.
> Wait without thought, for you are not ready for thought:
> So the darkness shall be the light, and the stillness the dancing.

Martin also introduced the thinking of William James – who described his perception as follows:

> People become conscious that they have a higher part that is conterminous and continuous with a MORE of the same quality, which is operative in the universe outside of them, and which they can keep in working touch with, and in a fashion get on board of and save themselves when all their lower being has gone to pieces in the wreck. (ibid: 132)

Many thinkers and writers, then, were aware of a dimension of themselves which was not normally recognised in daily living, and for which there was no clear and rational explanation. People struggled to describe an experience that was essentially intangible. Martin argued that depth psychology was a potential means of developing a greater understanding of the whole of our experience which may have beneficial consequences for the quality of our lives.

This was not just inquiry for its own sake. Martin was writing in the mid fifties, at a time when the cold war was at its height. He feared the dangers of totalitarianism, and wanted to find a way of creating a different kind of society.

> The struggle is for the spirit of man. And it is here that psychology can, perhaps, render unique service. It can enable science and religion to work together as never before. (ibid: 198)

He believed that as humans, we had become cut off from the deeper part of our consciousness, to our own detriment. His proposition was that we engage in an 'experiment in depth' in which the creative reality behind all religions can be found.

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> A new instrument of discovery has become available. It is for us now to use it aright. When the people of the world come to know the 'truth about God', not by hearsay only but by direct encounter, the cold war can be won – for both sides. .. (ibid: 264-265)

Although Martin was talking at a particular time in history, and the cold war is now at an end, we have not gained peace across the world. There continues to exist many wars and acts of terrorism. Consequently, the kind of endeavour that Martin was encouraging is still as valid now as it was then.

In trying to understand what was going on, Martin explored at length the relationship between religion and science, suggesting that it was out of balance.

> The religions of the world are ...living myths. This does not mean that they are 'mythical' in the ordinary sense. The living myth may also be the living truth.
>
> In the course of the last three hundred years a great new force has come into operation, profoundly affecting the living myth. This force is science. Its influence upon religions and upon ideologies has been fundamental, and fundamentally different. Upon religious beliefs the effect has been caustic....
>
> ...As a consequence, at the present time we have a world in which the living myth comes to people very little by way of religion .....From this it results that the peoples whose culture and civilisation were originally based upon religion find themselves, in a fashion, cut off from their roots, uncertain, undecided, unsure of themselves and of life.
>
> .....In some strange way science, the free search for truth, seems to have betrayed both us and itself. To all appearance, it is helping those who would suppress it. There is, however, another possibility. Perhaps it is not science that has betrayed us but we who have betrayed science. And this, on the whole, seems the likelier hypothesis. So far we have pursued the easy side of science, the side that can be readily 'proved', the side that yields quick results in profit and power, the side giving that comfortable feeling of certainty. The difficult side, the side that does not lend itself to conclusive demonstration, the side that punctures our vanities and does not directly advance our fortunes, the science of the human as a spiritual being, this we have not pursued with anything approaching the same ardour. Only now is it beginning to be developed. Particularly this is true of all enquiry into the depths of the human psyche. There we are still in the stage of partisan beliefs. And because of this lack of balance, because we know a great deal about atomic fission but next to nothing about human integration, we are paying the penalty of one-sided development: disruption (ibid: 5).

Martin believed that psychology could enable science and religion to work together in ways that had not been previously possible. He recognised that science and religion each had a number of different meanings, and it was necessary to be explicit as to which of the meanings was intended. Where religion was rigidly dogmatic, science had little to contribute. However, he maintained that religion based upon experience was in a totally different category. Here, science could be of service, if we were willing to create an expanded understanding of what constituted science, and included an investigation of inner worlds, as well as of the external natural world.

He believed, for example, that if a range of people were to use Jung's constructive technique, it could be possible to develop the psycho-perceptive faculties often used by mystics, and so become more aware of the processes at work at a deeper level of consciousness. In this way, the application of the scientific method to religious experience could be established on a new basis. This could be achieved if a sufficient number of individuals undertook the experiment in depth, and recorded their experience in relevant form.

So, Martin suggested, it was perfectly possible for science and religion to work together. However, he acknowledged there were challenges in applying a scientific method to the workings of the unconscious. The first difficulty lay in the nature of the experience. We were not here dealing with the 'objective' world – that is, the world that reaches us by means of the five senses. Rather, our attention was on the trans-subjective world, using methods of inner perception.

Secondly, there could be no certainty about any conclusions reached, only an increasing degree of probability. Each person's experience would be unique to themselves. However, as each person shared that experience, it may be that there were certain features that were sufficiently common to provide a body of corroborative experience which deepened and widened as an increasing number of independent investigators made the experiment.

Martin asked:

> Is scientific method to be restricted to those areas where something approaching certainty can be achieved? If so, we condemn all those pioneers of science who in the past went forward, under every disadvantage, bent on discovering what they could with such instruments as they had; and by their courage and determination built up the body of scientific

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knowledge we now possess. And we condemn science itself to a meagre and misleading existence, based as it would be on such fragmentary knowledge as can be acquired by the so-called 'exact' techniques; ignoring that the small segment of reality thus adventitiously explored would be just as likely to distort as to illuminate our view of the whole.

Clearly, scientific investigation cannot be thus confined. It is true that where the pursuit of science is little more than a personal activity, or where the feeling of certainty it brings is clutched at as a substitute for religion, there is a natural tendency to play safe and refuse to apply scientific method anywhere outside the accepted ruts. But where the scientific spirit truly moves there can be little doubt as to what should be its scope of enquiry. Scientific method is for the discovery of truth on all fronts, the psyche no less than the physical world. And since our knowledge of the psyche is far behind that of the physical world, the investigation itself far more difficult, and the issues at stake infinitely more momentous, it is on this sector that we need to concentrate. (ibid: 201-202)

It is necessary that men and women should undertake the experiment in depth in their own lives; and report back on what they encounter. ...The essence of the experiment is that there shall be no rigid following of doctrines laid down, but instead a dialectical process of discovery: on the one hand, a continuous formulation and reformulation of hypotheses, to serve as guide for the individual experiment; on the other, a continuous intensive verification of these hypotheses as the individual experiments proceed. (ibid: 202)

Martin, then, was suggesting that people's experience of their inner worlds, including their spiritual experiences, could be undertaken by setting up the experiment in depth on a scientific basis. He believed that this could form a whole new field of activity for the 'sciences of man'. He recognised that a research methodology which involves the development of faculties latent within the scientist herself would not be amenable to everyone. However, he wanted to stress how important he considered this development to be:

In the experiment in depth, **social scientists have possibilities of action research vastly surpassing in importance anything so far undertaken by man**: an unexpected universe of experience, in which all the great inventions wait to be made. ...As and when (an) understanding of the human spirit is reached, psychology, science and religion can work as one. (ibid: 204; bold font added)

Despite this emphasis on the significance of action research as a means of enabling scientists to access and use all aspects of their experience in the pursuit of discovering spiritual truths which could be used to improve the quality of human living, it was never widely accepted as a research methodology until the 1970's. Even then, it was used mainly to address problems in the social world, rather than to explore deeper dimensions of human experience.

However a major exception can be seen in the work of John Heron (b.1928) who in 1970 founded the Human Potential Research Project, University of Surrey, which was the first academic centre for humanistic and transpersonal psychology and education in Europe. Heron has also inquired extensively over several decades into the realms of the spiritual and the subtle (Heron 1996, 1998, 2006).

John Heron, a Participatory Paradigm, and Co-operative Inquiry

John Heron created co-operative inquiry as a form of action research which enables exploration of all aspects of what it means to be human. In hisintroduction to *Co-operative Inquiry* (1996) Heron acknowledged the influence of Kurt Lewin, but also stated that he hadtaken Lewin's ideas, and developed them extensively. He saw his form of action research as being:

persons in reciprocal relations using the full range of their sensibilities to inquire together into any aspect of the human condition with which the transparent body-mind can engage (Heron, 1996:1)

Heron's development of co-operative inquiry is founded on a clearly articulated ontology and epistemology. He believes in a participatory reality, which he describes as follows:

There is a given cosmos in which the mind creatively participates, and which it can only know in terms of its constructs...We know through this active *participation* of mind that we are in touch with what is other, but only as articulatedby our mental sensibilities. Reality is always subjective-objective: our own constructs clothe a felt participation in what is present. World and people are what we *meet*, but the meeting is shaped by our own terms of reference..... In meeting people, there is the possibility of reciprocal participative knowing, and unless this is truly mutual, we don't properly know the other. The reality of the other is found in the fullness of our open relation (Buber, 1937), when we each engage in our mutual participation. **Hence the importance of co-operative inquiry *with* other persons involving dialogue, parity and reciprocity in all its phases.**

(Heron, 1996:11; bold font added, italics in original).

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So, Heron is presenting an ontology that asserts a mind-shaped reality which is subjective-objective: subjective because it is known through the form that the mind gives it; and objective because the mind interpenetrates the given universe that it shapes.

From his ontology, Heron derives his epistemology. This maintains that there is a "participative relationship between the knower and the known, and, where the known is also a knower, between knower and knower. Knower and known are not separate in this interactive relationship" (1996:11).

Heron's participatory paradigm asserts that, as human beings, we are not capable of having any final or absolute experience of what there is. Because of the nature of participative knowing, the experiential knower influences the perception of what is there, even when the perceiving mind is relatively free of conceptual labels which attempt to represent reality. However, the significance of experiential knowing is that the very process of perceiving is also a meeting with what there is. We find ourselves in a state of co-presence with another person or dimension of being. Hence experiential reality is always subjective-objective.

Skolimowski says:

> Things become what our consciousness makes of them through the active participation of our mind (1994: 27-28).
>
> The cosmos or the universe is a primordial ontological datum, while the 'world' is an epistemological construct, a form of our understanding. (1994: 100)

Heron summarises his perspective:

> From all this it follows that what can be known about the given cosmos is that it is always known as a subjectively articulated world, whose objectivity is relative to how it is shaped by the knower. But this is not all: its objectivity is also relative to how it is intersubjectively shaped. For there is the important if obvious point that knowers can only be knowers when known by other knowers: knowing presupposes mutual participative awareness. It presupposes participation, through meeting and dialogue, in a culture of shared art and shared language, shared values, norms and beliefs. And, deeper still, agreement about the rules of language, about how to use it, presupposes a tacit mutual experiential knowing and understanding between people that is the primary ground of all explicit forms of knowing (Heron, 1996). So any subjective-objective reality articulated by any one person is done so within an intersubjective field, a context of shared meanings - at one level linguistic-cultural and, at a deeper level, experiential.
>
> (http://www.human-inquiry.com/partknow.htm)

Heron's idea of a participatory reality is radically different from the Newtonian scientific view of the mechanistic universe, which is governed by inbuilt laws that determine its behaviour. However developments within physics itself are becoming more in accord with Heron's views. For example, John Wheeler (1911-2008) an American theoretical physicist, and a collaborator with Einstein in a search for a Grand Unified Theory of physics, developed the concept of a 'participatory universe' to explain the strange findings emerging from quantum physics:

> The quantum principle has demolished the once-held view that the universe sits safely 'out there' … We have to cross out that old word 'observer' and replace it by the new word 'participator'. In some strange sense the quantum principle tells us that we are dealing with a participatory universe. (1974:689).

David Bohm (1917-1992), an American theoretical physicist, maintained that

> This reality is one unbroken whole, including the entire universe with all its 'fields' and 'particles'…To begin with undivided wholeness means, however, that we must drop the mechanistic order. (1980)

He developed the idea of an 'implicate' and 'explicit' order, in which the former was seen as a deeper and more fundamental order of reality. The implicate order unfolded into the explicate, which was the reality that humans normally perceive. He described this process as follows:

> What we perceive through the senses as empty space is actually the plenum, which is the ground for the existence of everything, including ourselves. The things that appear to our senses are derivative forms and their true meaning can be seen only when we consider the plenum, in which they are generated and sustained, and into which they must ultimately vanish.
>
> (Bohm 1980: 191-192)

Bohm began to speculate that these ideas might serve as a metaphor for understanding other levels of experience, including consciousness itself. Isaacs, in talking of Bohm, says: "He had begun to identify the implicate order in the external world, but now he was positing that there was a direct correlation to it in thought that could also emerge or be evoked within us" (Isaacs 1999: 39)

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Consequently, the idea of a relational subjective-objective world resonates with findings from quantum physics. However conventional science continues to engage in research from a third person perspective. Despite an increasing acceptance that the subjective consciousness of the observer influences the nature of reality that emerges, there has been little acknowledgement of the need to develop research methodologies which value and pay attention to the felt experiences of the individual, and how, for example, an account of intimations of a spiritual dimension from a first person perspective may be of greater value than a continuing focus on third person abstract theorising. Of course, the challenge often presented in relation to the legitimacy of subjective accounts is that they are unique to that individual. However the main point of co-operative inquiry is that it incorporates the sharing of experiences in a group setting; and the nature of the reflection and dialogue is such that it is possible to identify common themes and experiences. Perhaps more importantly, the evidence suggests that when members of a group share their own deep experiences, and listen deeply to the experiences of others, in an ethos of care and mutual respect, that in itself can generate a shift in consciousness, and a new awareness can be created which no one person had before the process began. In other words, such a process not only generates knowledge in and of itself, but it can result in a transformative shift in being for both individuals and the group as a whole (Heron 1998).

Heron provides an overview of what is involved:

> Co-operative inquiry involves two or more people researching a topic through their own experience of it, using a series of cycles in which they move between this experience and reflecting together on it. Each person is co-subject in the experience phases and co-researcher in the reflection phases.
>
> Only shared experience and shared reflection on it can yield a social science that does justice to the human condition. The researcher who wants to do research on or about other people's experience of the human condition is not only likely to misrepresent it, but is open to the charge of being in flight from a full openness to his or her own experience. Moreover, the misrepresentation and the flight are likely to reinforce each other.
>
> It seems that the human condition within myself, in relating with others, and on the wider canvas, is about increasing self-direction in living, in co-operation with other persons similarly engaged. And that this quest for personal and social transformation, for the interacting values of autonomy and co-operation, is at the heart of any truly human social science.
>
> A research cycle can be followed, moving between experience and reflection. This model can be applied to any aspect of the human condition (including any aspect of consciousness studies, which includes a focus on subjective experience).
>
> (Heron,1996: 1-2)

In his book *Sacred Science* (1998), Heron provides a number of reports of inquiries into the spiritual and subtle, and also details his participatory theology and cosmology. However the main purpose in my including an extensive section about Heron's methodology is not necessarily to advocate his worldview, nor to promote his work as being superior to others. His main significance, from my perspective, is that he has recognised the importance of researching first person subjective experience within a collective setting, using a process and principles that enables intersubjective sharing. He has also developed a range of validity procedures which allow for a critical analysis of the authenticity and significance of any claims to knowledge. As there has been little attempt within the scientific world to develop methodologies that give equal value to first as well as third person experiences, I consider that Heron has provided a valuable contribution in an area which warrants far greater attention than it currently is given.

Conclusions: Beyond the ontological and epistemological barriers of traditional science

Due to its adherence to the unproven but deeply embedded conviction in the primacy of the physical cosmos, traditional science has become trapped in a *petitioprincipii* – a fallacious argument, where the conclusion is essentially a repetition of the original statement. In this context, the argument goes as follows. The scientific paradigm is based on the belief that matter is the primary substance of the universe. Scientific methods have consequently been developed based on their ability to observe and analyse material entities. Rules of what constitutes valid evidence are also grounded in the assumption that all aspects of reality are law-driven, ultimately predictable, and accessible by the five senses. Any event that is experienced as non-material, such as intimations of a spiritual reality, are deemed to be epiphenomena of the brain. Consequently the means of understanding a person's intimations of a spiritual reality is to study their brain, and to work out what is happening which is causing that experience. When the suggestion is made that perhaps there may be other explanations for spiritual experiences, which would require the development of a different kind of science, the response is that science is not able to provide evidence to support the validity of such experiences. This response is based on the original, essentially faith-based belief that matter is primary, and hence all subjective experiences have to be secondary phenomena. The fully circular fallacious argument has been completed. Indeed, the very notion of scientific method is defined, determined and constrained by these same assumptions, suggesting that only aspects of the universe that can be studied by those methods are 'real'.

To accept that matter may not constitute the primary building blocks of reality, and that traditional science may only have validity for certain aspects of the physical world, would shake the foundations of the scientific world, in ways that would threaten the entrenched belief systems of

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many scientists, to an extent that may well jeopardise their mental wellbeing. It seems they are not able or prepared to think outside their carefully crafted solid box. So the commitment to materialism continues, for reasons that may well have nothing to do with the growth of knowledge and an authentic search for 'truth', but instead have a considerable amount to do with the scientists themselves acting in a way that protects their sense of psychological security, or perhaps even of professional pride.

The consequence is a continuing attachment todeeply embedded, habitualised ways of perceiving the world, rather than being prepared to risk expanding science in ways that accept different possibilities in relation to the nature of reality, and the significance of human life within that reality.

In this paper, I not only join forces with others in arguing for a radical challenge to the materialist fundamentalistmindset, but make a plea that as a research community, we pay more attention to developing and engaging with research methodologies that allow us to experientially explore subjective perceptions of a reality that many believe exists, and indeed many experience as existing, beyond the physical world.

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Session: Scientific Critique of Life Science

Chairpersons: S.R. Bhatt, Ph.D., *Chairman, Indian Council of Philosophical Research (ICPR), New Delhi, India*
&
Bhakti Niskama Shanta, Ph.D., *Gen. Secretary, Sri Chaitanya Saraswat Institute of Spiritual Culture and Science, Bengaluru, India*

Talk 1:

ORIGIN OF LIFE ON EARTH: COMPARISON OF OPINIONS FORM MODERN SCIENCE AND VEDANTIC VIEWS

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Abstract
The quest for knowledge began right from the beginning of the human civilization. While harnessing science to solve the problems of his everyday life, man started observing the nature with curiosity and also sought to understand the relation between nature and living beings. Human curiosity to find out the origin of living beings led to the queries on the first appearance of life on this planet. However, starting from the Vedic period to the present age, the question remains unsolved despite astonishing progress in the state of knowledge in various branches of science witnessed during the past few decades. In this presentation, attempt has been made to summarize the various postulations made on the origin of life starting from Vedic period to the modern science. It reveals that the idea of an entity called "consciousness (chaitanya)" always being present in the universe dealt with in the Vedanta is still relevant. This idea provides a rational explanation to the appearance of a living entity on earth.

Key words: Cell biology, adaptation, origin of life, Vedantic views, bacteria

Introduction

Right from the dawn of civilization, origin of life remains an exciting question. In the pre-historic earth man was nothing better than a helpless child. Sustainment of existence in a hostile natural environment and fierce animals was the major challenge for him. In course of time, he unveiled the mysteries of nature and gained command of the natural forces. Lightning was an awe-inspiring entity to him. But today he is using electricity in every step of life. Likewise, he tamed various other natural forces and use for his own purpose. The endeavour to understand nature and its activities continued and developed into modern science of the recent times. However, the origin of life on earth continues to remain an unsolved mystery.

During the ancient times several branches of philosophy were developed in various parts of India. The seers, based on their wisdom and observations, put forth some ideas on origins of life and evolutionary processes. These ideas were generated mainly out of their perception and interaction among themselves. The Vedas are considered the most ancient scriptures. The commentaries on Vedas were aptly summarized in the Vedanta. The Vedanta explains the diverse views of humanity and their final unique destination and also vocates a systemic study towards the search for ultimate truth. It describes the nature of life, its transformation and purpose. The individual experiences and the collective wisdom are the roots of this philosophy.

Form the 16th century onwards, science scripted the history of progress of the civilization. Science and technology helped us in several ways and provided ease and comfort to our everyday life. But the modern science also seeks to unravel the secrets of nature and also to find the origins of life on earth. The question still remains challenging even today.

The present paper will discuss the overall progress of the scientific studies on the origin of life at the molecular level and also highlight the limitations of these endeavours. Subsequently the ancient Vedantic views on the origin of life will also be discussed in brief and attempt will be made to synchronize the outcomes of these two approaches.

Studies on bacteria

Bacteria are unicellular organisms. They were proposed to have originated about 3.5 billion years ago. They continue to exit. There are several theories proposed to the origin of life on earth such as abiogenesis- life arising from non living matter. In the year 1665 Robert Hook discovered small structural units in a cork and called them cells. Subsequently in 1676, Antonie Van Leevenhoek visualised microorganism through his hand-made microscope. The organisms seen by him were subsequently known to be bacteria. In those days, it

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was thought that life was formed spontaneously. The existence of microorganism is itself an evidence for spontaneous formation of life as they are very simple for sexual and asexual reproduction. Cell division was not observed by that time. Leevan Hook extrapolated these ideas and thought that fleas and lice could spontaneously form-putrefaction. Similarly frogs could arise from slime. Subsequent experiments such as sealed and open meat incubation and a close study on insect production; he was convinced that the idea of spontaneous generation was not correct (Bondeson 1999).

Luis Pasteur (1822-95), a French chemist and microbiologist conducted an experiment with the swan-neck flask to study the spontaneous generation of microorganisms. He used two swan neck flasks (S shape) and kept nutrient rich broth and boiled both the flasks till all microorganisms were killed. He called it infusion and allowed it to sit. In another flask the infusion was allowed to be exposed to air. The flask exposed to air was found to encourage growth of the microorganisms, whereas the second flaks showed no growth. With this experiment he demonstrated that microorganism does not appear by spontaneous generation. So, it is clear that even microorganism can't appear spontaneously. Studies on the origin of life may help in producing life in the laboratory. The study of abiogenesis considers geophysical, chemical and biological properties. Several experiments were conducted to prove this hypothesis (Muller 1953, Other theories on origin of life).

Some ideas were floated that life might have originated by self - replicating, self -organizing biomolecules like RNA (Gilbert 1986, Copley et al. 2007). Theories like virus first may support the theories of RNA world (Yates 2015). This study carried out by a biology professor Gustavo Caetano-Anollés led to the evidence that viruses are alive and share a long evolutionary history with other life forms. One of the difficulties of viral origin is their high rate of mutation, particularly retroviruses like HIV (Katzourakis 2013).

Studies on protocells that form self organized, self-ordered collection of lipids are thought to be the preliminary step for the origin of life (Irene 2010). Even though functional protocells are not produced in the laboratory, some scientist feels that the goal is within the reach (Irene 2006).

LUCA, or the Last Universal Common Ancestor remains conundrum for the scientists, but some answers were derived from the genetic code. LUCA, in other words a single cell expected to be the common ancestor to all live beings on earth. It is estimated that the cell of this kind lived, perhaps 3 or 4 billion years ago. According to this school of thought life arose on earth only once. The living entities from humans to bacteria contain DNA. This material is common to all life forms. The answer to life is expected to have written in the form of genetic code. The genes are responsible for making proteins, which are the functional units. Proteins make DNA, digest the food, metabolise the nutrients, protect the body from microbial attack and perform and several other functions. Astonishingly, the same codes are used in bacteria or human being. Thus, it is possible to express a human protein in bacteria. Insulin is an example, which can be made in this way. Since the genetic code is the same for all life forms, this shows that all life forms are related. All life forms produce offspring's. Following this logic, biologists succeeded in making the mother of all family trees- the tree of life. The tree of life consists of three groups, Archea, bacteria and eukaryote (Woese 1990). Scientists are re-constructing the life tree using current knowledge. The important questions asked during the process are: What about the genes lost, genes swapped and how is it possible to say if a gene is ancient?

Synthetic biology is a new emerging field of research which will fuel research in biotechnology, and help in generating several products useful for the mankind. It also aims to make synthetic cells from chemical and biochemicals but cannot provide an answer to the question on the origin of life on earth.

Dr Craig Venter, founder of Craig Venter's Institute in La Jolla, California and his co-workers were successful in creating a minimum cell, JCVI-syn 3.0 with 473 genes (Hutchison III et al.2016). *Mycoplasma genitalium* – contains 525 genes which is an organism with the smallest number of genes containing organism in nature. The new cell made in the Venter's laboratory contains at least 50 genes lower than the natural life from. This work provides a giant stride in the understanding of the molecular mechanism that sustains life but throws little light on the origin of living entities.

Another theory called "Panspermia" suggests that life may exist on the universe, and microscopic life was transported to the earth by meteorites, asteroids and other solar system bodies and it is speculated that biochemical life has begun about 14 billion years ago (Abraham 2014). This theory suggests that life has originated from other planets or planetary bodies.

Scientists started at understanding the composition of the biological cells using OMICS technologies. These technologies are very powerful to determine all the biomolecules present the biological cells but their origin remains a moot question. Stanley Miller (1930-2007), an American chemist demonstrated that biochemicals are formed in special experimental conditions. But this experiment does not explain the origins of life on Earth. This only predicts that life could have originated on earth by basic molecules present on Earth.

Genomics, Proteomics, and other OMICs technologies

Nucleic acid, proteins, lipids along with other biomolecules forms part of all living beings on earth. It is thought that several of these biomolecules interacting in a specific and critical fashion provides the crucial requirements of life. With the latest developments in the technology, it is possible to determine the genomic sequence of the bacteria using different techniques. It is also possible to identify the proteome of bacteria under specific conditions of growth. Proteome is dynamic. It changes from time to time like growth stage, medium components, and environmental factors like temperature. Proteome represents the functional changes and requirements of bacterium from time to time. It is also possible to identify different metabolites from the bacterium. In a nutshell, it is possible to identify all the bio chemicals that bacterium contains by reductionist approaches along with quantification. But this does not allow to creation of a new bacterium with the available molecular analysis.

To make bacteria out of these molecules is next to impossible. The molecular interactions in a living cell are very crucial. A colon

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bacterium produces another colon bacterium in a matter of few minutes. The genetic, biochemical reactions are maintained so precisely that they do not commit any mistake in sustaining life. They produce exactly other bacteria. However, the mutations in the genes create new verities making new phenotypic and genotypic forms. But to understand these precise interactions and reproduce them in the laboratory is very difficult.

What are the limitations?

Levinthal's paradox

Protein folding is an important aspect to study structure-functional studies. Levinthal proposed a theory of protein folding. In 1969 Cyrus Levinthal proposed that an unfolded polypeptide chain will have astronomical number of conformations due to the large number of degrees of freedom of the chemical bonds present in it. A polypeptide containing 100 amino acid residues have 99 peptide bonds and possess 198 phi- psi bond angles. If each of these bond angles can be in one of the three stable conformations, the protein may fold in to 3^{198} different conformations. Hence, if the protein has to fold randomly to achieve the correct functional form, it may require a time larger than the age of the universe. Even if the conformations taking place rapidly at nanosecond to picoseconds. The paradox is that small proteins fold spontaneously in millisecond to microsecond time scale. Lavinthal states in his paper that ". If the final folded state turned out to be one of the lowest configurational energy, it would be a consequence of biological evolution not of physical chemistry". The paradox remains unanswered (Nagaraj 2013) in spite of several years of research and arguments on this issue (Karplus 1997, Ben-Naim 2012).

Involvement of biomolecular interactions

The macromolecular interactions are known to play a significant role in the functions. The high specific interactions among macromolecules are crucial for life forms for their function. Macromolecular interactions can be studied using ultracentrifuge, based on sedimentation velocity and other physical parameters (Harding et al. 2015). If the molecules were left alone to interact with each other, the time taken by them to interact similarly with the biological systems, will look like an astronomical figure. Under these conditions they can't form the right interactions in the finite time. Then the question arises how the life forms are able to do these processes in a matter of fraction of seconds.

Bacteria are living on the earth for several millions of years. There may be some genetic mutations in different generations, but the original species remained the same adapting to different conditions. This suggests that life is a continuing process.

Present state of understanding based on traditional Indian philosophy

Thus it is obvious that despite astonishing progress of the understanding of the processes that sustains life it has not yet been possible for the scientists to locate the origin of life.

Science is collective endeavour of several individuals/ groups contribute to its progress. Science accepts corrections and agrees with logically and experimentally provable concepts. The limits of science should be expanded to include logically established ideas of other branches of knowledge such as philosophy.

The methodology used in Vedanta is scientific. It seeks to realize the ultimate truth through discussion/ debate (guru and shishya parampara), analyse and search for the ultimate truth. Vedanta describes the nature of life, its transformation and purpose. Curiosity is an essential component for Vedantic studies.

The concepts "Life comes from life" and "matter comes from life" are valid facts emanating from Vedanta. The Vedantic views are offering an alternate point of view, which can't be neglected. It is mentioned that life has neither beginning nor end and it is a continuous process. Can anybody find the beginning and end to the circumference of a circle of a finite radius? Similarly life according to the Vedantic view on earth is an entity which has no beginning and no ending. If atoms and molecules are the origin, then what is the origin form them?. If subatomic particles are the origin, then what is the origin of them? This question is endless and does not have an answer. It is important to acknowledge the knowledge where ever it is and in which ever form should be accepted and assimilated. The limits of science should be expanded to accommodate knowledge, even it is coming from different subjects, be it philosophy or any other branch of knowledge.

The Vedantic views are providing a strong base to understand the problem. Instead of looking into these views, some people are trying to equate Vedanta to "creationism" or "Intelligent design". The baseless nature of these ideas has already been revealed (Shanta 2015, Jagannadham 2016). The source of infinite consciousness (paramatma) is present in all living beings as chaitnya (consciousness) that guides involuntary functions of the living organisms. The things that living organisms appear to control are due to the infinite consciousness coming from the soul (Jagannadham 2016).

Abiogenesis, big bang theories are being questioned by Vedantic scholars. The belief of Scientists that chemical evaluation transformed into Biological evolution and that in turn caused the entire biodiversity on the planet is strongly criticised by Vedantis. They strongly suggest that life comes from life. An "organic whole" cannot arise from the part by assembly (Shanta 2015). In molecular genetics, the species deliberately and aggressively act to correct or destroy random mutations. In the history of Universe the species preservation is a natural characteristic of life. Life's ability to preserve its own species is a major challenge to Darwinian gradualism. This also suggests that the diversity of life could also be ancestral.

With this kind of arguments, it is very clear that Vedanta is able to offer some clues to the origin of life. It clearly states that there is no origin or end. Life is a continuous process. If arguments like Panspermia have to be accepted then, the question on life emanating from earth does not arise.

Hence it is important to understand the ancient Vedantic wisdom and include in the studies of Modern science that gives alternate views like subjective aspect of consciousness, which can't be denied. There is a general tendency in the scientific community to believe that all theories of modern science are acceptable only when they are empirically verifiable. There is no justification to think that theories developed from other branches of knowledge such as philosophy are all fallacy, because all the fundamental concepts (for example

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Cartesian coordinates) of science are developed based on philosophical grasping at truth.

Hence, in my opinion it is very important to find the relation between Vedanta and Modern science in the interest of humanity.

Conclusions

Despite astounding progress in different branches of objective science, it has not been possible to provide a satisfactory explanation regarding the origin of life. Vedanta provides alternate views on origin of life and consciousness. Our ancient philosophy (Vedanta) looks in to the questions from a different point of view. It emphasises that life is nothing but a manifestation of consciousness (Chaitnya) which is always present in the universe. There is no question of beginning or ending like water in the endless ocean manifests itself in the form of bubbles, the consciousness manifests itself in the form of living entities (microorganism, plants, and animals). When bubbles burst their water content gets mix in the ocean, similarly, following the death of the living organism, the consciousness in them (jeevatma) merges with the ever existing vast consciousness (paramtma).

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Talk 2

Restoration of Brain Functions by Rewiring and Remodelling of Neural Circuits

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Neuronal plasticity refers to morphological, biochemical, behavioral and electrophysiological alterations in both the adult and developing nervous system. Although neuronal circuitry is capable of undergoing different types of alterations, synaptic changes are the most critical ones because they alter communication between neurons. Synaptic plasticity pertains to changes in the complex synaptic networks of individual brain circuits in response to various interventions. The brain is able to remodel its connections in order to adjust the organism's response to changing conditions. The brain shows greatest plasticity during early development when connections between neurons are being made for the first time. The connections are often formed under the guidance of sensory experience.

The role of activity-dependent synaptic plasticity in learning and memory is a central issue in neuroscience. Much of the relevant experimental work concerns the possible role of long-term potentiation (LTP) and long-term depression (LTD) in learning. The formation of lasting, long-term memory occurs gradually, over time, following learning. It has been shown that LTP can cause structural changes by strengthening the existing synapses or resulting in the formation of new synapses. It is evident that central nervous system retains a remarkable ability to modify the number, morphology and activity of synapses. The capability of synapses to alter their structure and number in response to physiological usage may underlie or play a critical role in plastic neurobehavioral processes. The gene knock out / transgenic technology further enhanced the understanding of the role of various signaling molecules and proteins in neuronal plasticity. The capacity of the nervous system to reorganize the pattern of synaptic connectivity needs to be further understood in both health and disease states.

Recent progress in our understanding of neuronal plasticity confirms that patterns of neuronal connectivity are not rigid. Merzenich and Kaas (1982) demonstrated that the sensory maps can be redrawn in adult brains and suggested that the brain is a network that is continually remodelling itself. Their findings brought everybody's attention to the idea that plasticity occurs in the adult nervous system and inferred that the adult brain can reorganize itself in areas that were long thought to be completely hard-wired. The concept of neuronal plasticity has been extensively used to deal with the enduring changes associated with brain's capacity to rewire, remodel the connectivity by experience (Shankaranarayana Rao et al. 1998d, 2001c, Shankaranarayana Rao and Raju, 2001a).

Numerous studies have proven the biological basis of memory formation and have begun to identify the biochemical traces and cellular circuits that are formed by experience, and which participate in the storage of information in the brain, its retention for long durations, and its retrieval upon demand. Cells in the nervous system have the capability of undergoing extremely long-lasting alterations in response to hormonal, pharmacological, and environmental stimulations. The mechanisms underlying this neuronal plasticity are activated by experiential inputs and operate in the process of learning and in the formation of memories in the brain (Kutty et al. 2003, Shankaranarayana Rao and Raju, 2001a).

I. Plasticity and Development of the Nervous System

The development and plasticity of the nervous system involves the coordinated actions of a huge number of individual neurons. Neurons of the appropriate types must be generated in appropriate places in optimal numbers. They must migrate to their final positions. They must differentiate into their final forms, growing out dendrites and axons. The axons must follow the right paths on the way to their targets, and when they reach there they must recognize the correct parts of the target structures and the appropriate kinds of cells there with which to make contact. Finally, with all the connections approximately right, neurons must refine their synaptic connections to a high degree of precision, keeping or finding almost all the right ones and getting rid of all the wrong ones. After the brain is built, it must be able to change, dramatically during early life and to a lesser extent thereafter, to accommodate growth of the organism and new behavioral or intellectual capacities.

A. Molecular signals guide the early stages of brain development

The stages of this process prior to the final refinement of connections are orchestrated by an elaborate series of molecular signals. Some of these signals, in common with developmental signaling in other parts of the body, confer identities on particular cell types, setting them forth on specific programs of differentiation. Other signals attract or repel growing axons, and still other signals lay out the many topographic maps that organize sensory and motor system.

One of the big surprises in neural development is the prominent role of naturally occurring neuronal cell death. All cells are programmed with death pathways that can be activated by the receipt of certain signals or the failure to receive other signals. It appears that the perfect match between the amount of innervations and of the tissue innervated is achieved, at least in part, through the overproduction of

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neurons followed by a competition among them for innervation of limited synaptic space in the target structure. In some cases, the target supplies limiting quantities of a neurotrophic factors. In the normal course of events, there is not enough neurotrophin to support all the input neurons, so many may die. Experimentally, giving extra neurotrophin can prevent this cell death. There is also good evidence that some of the neurotrophins, at least brain-derived neurotrophic factor (BDNF) and neurotrophin 4/5 (NT4/5), play important roles in maintaining neural connections. The neurotrophin story is likely to flourish during coming years and drugs directed at neurotrophin responses may come to play an important part in treating some debilitating diseases of nervous system.

Electrical activity and membrane depolarization have been shown to determine the survival and development of retinal ganglion cells (RGCs) (Govindaiah, 2001). Voltage activated ion channels of sodium, potassium and calcium underlie the genesis of spontaneous electrical activity of developing neurons. We have investigated the role of BDNF on the expression of voltage gated sodium, potassium and calcium channels in developing retina at various intervals, both qualitatively and quantitatively by measuring the immunofluorescence using confocal microscope. The expression of these channels followed a distinct developmental pattern suggesting that enhanced channel expression underlies the increased membrane potential observed during various developmental periods (Marita et al. 2003). Our results demonstrated that trophic factors derived from the target nuclei would refine the neuronal circuitry. As the trophic factors are considered as potential drugs, trophic therapy can be used to ameliorate certain neurodegenerative disorders. Our studies have shown that BDNF and CNTF attenuate the neurofilament phosphorylation in the soma of cultured rat spinal cord neurons exposed to CSF from patients with amyotrophic lateral sclerosis (Shahani et al. 2003).

B. Role of neural activity to refine and adjust connections in later stages of brain development

In the normal adult brain, many neural connections are refined to perfection, down to the level of individual cells. Much of this refinement takes place during critical periods in early development, in which many excess transient synaptic connections are made with the right kinds of cells in the appropriate areas, and these connections are maintained only if they are followed by appropriate patterns of neuronal activity.

Each structure in the brain that has been studied has its own critical period. In the visual system, for example, the retinal ganglion cell axons from the two eyes initially overlap over most of the lateral geniculate nucleus (LGN), and neural activity is required for these axons to sort out into eye-specific connectivity. Blocking activity prevents this refinement and the formation of layers. After a few weeks of re-arrangement, the connections become fixed, so that no disturbance of activity can alter them. It is interesting that the activity-dependent refinement of connections to the LGN does not require visual input. Indeed, it happens before birth, where there is little light to stimulate the eyes. The spontaneous activity generated in the retinal ganglion cells (RGCs) and geniculate neurons seem to be sufficient.

Our studies have shown that intrinsic / spontaneous electrical activity is crucial for the development of RGCs (Govindaiah, 2001). The RGCs displayed synchronous bursts of activity during initial stages of development and this increased firing frequency coincided with enhanced metabolic activity in these cells (Govindaiah et al. 2001). Synchronized spontaneous rhythmic activity is a feature common to many parts of the developing nervous system and is necessary for the formation of precise connections. The present findings indicate that RGCs *in vivo* displayed increased excitability during the period of synaptogenesis, which may lead to alterations in the expression of synaptic proteins (Dhingra et al. 1997, 2001). Understanding the process of activity-dependent development could revolutionize our ability to identify, prevent, and treat developmental disorders resulting from disruptions of neural activity that interfere with the formation of precise neural circuits. Developing circuits in the retina generate synchronized patterns of bursting activity that contain information useful for patterning connections between RGCs and their central targets. How the developing retinal circuits generate and regulate this spontaneous activity pattern is still not completely understood.

Current understanding of the mechanism involved in activity-dependent neural plasticity correlated activity between an input axon and its target cell is rewarded by making the synapse grow bigger and stronger, and discordant activity is punished by making the synapse shrink, or in the most extreme cases, disappear entirely. A synapse with such a mechanism is referred to as a Hebb synapse, which states "neurons that fire together wire together" (Hebb, 1949).

II. Morphological Plasticity

A. Dendritic plasticity

Dendritic outgrowth in hippocampal and motor cortical neurons in adult mammals is influenced by various factors such as nutritional status, hormones, aging, brain lesions, social isolation, sensory deprivation, exposure to complex or enriched environment, training for various tasks and electrical stimulation (Shankaranarayana Rao 2003b, Shankaranarayana Rao et al. 2001c). Somatosensory cortical pyramidal neurons show an increase of basal dendritic branches in kittens after training for shock-avoidance learning. Greenough et al. (1985) have reported that training the rats to reach for food, results in increased branching of apical dendrites of layer V pyramidal neurons in the anterior cortical region, which are involved in sensory and motor innervation of the contralateral forelimb of the rat. Similar changes have also been observed in layers II-III pyramidal cell basilar dendrites in rat motor-somatosensory forelimb cortex. Jones and Schallert(1994) have demonstrated the use-dependent dendritic growth in layer V pyramidal neurons of the motor cortex. In addition to the effect of various environmental factors, the treatment of (-) deprenyl, a selective monoamine oxidase-B inhibitor resulted in a significant increase in the dendritic arborization of CA3 hippocampal and layer III prefrontal cortical neurons in the monkey brain (Lakshmana et al. 1998b, Shankaranarayana Rao et al. 2000).

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Dendritic outgrowth in adults can also occur by electrical stimulation. Rutledge et al.(1974) observed the additional outgrowth of apical dendrites in the cortex of adult cats after long-term electrical stimulation applied to the left suprasylviangyrus. After this period, it was observed that apical dendrites of layer II and III pyramidal neurons were shown to have significantly more dendritic branches and spines in the cortex contralateral to the stimulated side. They interpreted this as evidence that increased use of specific pathways to and within the cerebral cortex of adult cats can induce postsynaptic growth. Furthermore, self-stimulation rewarding experience for 10 days resulted in an increase in the dendritic branching and dendritic length in CA3 hippocampal and layer V motor cortical pyramidal neurons (Shankaranarayana Rao et al. 1993, 1994a) and such changes were found to be long-lasting (Shankaranarayana Rao et al. 1998e).

In addition to the dendritic growth, the size of brain regions altered significantly by different experiences. For example, Walsh et al. (1972) observed the medial area of the hippocampus was significantly thicker in animals reared in complex environments than those reared in isolation. Rosenzweig (1966) also reported that there was an increase in the size of hippocampus as a consequence of exposure to complex environment. Our studies have revealed a significant increase in the thickness of lacunosum, radiatum and lucidumlaminae in the CA3 region of hippocampus in self-stimulation experienced rats (Shankaranarayana Rao et al. 1993).

Severe traumatic stress or repeated exposure to stress can result in long-term deleterious effects leading to depression. It has been shown that restraint stress for 21 days causes a selective atrophy of apical dendrites of CA3 neurons of hippocampus (Shankaranarayana Rao et al. 2001e).As a compensatory mechanism, the density of dendritic spines was increased in these neurons to overcome decreased dendritic arborisation (Sunanda et al. 1995). Interestingly, the stress-induced atrophy of dendrites was completely reversed by 45 days of rehabilitation (Shankaranarayana Rao et al. 2001e). Chronic restraint stress is reported to induce sexually dimorphic neuronal remodeling in the CA3 region of the hippocampus (Mitra et al. 2002, 2003). In contrast to the effects in the hippocampus, chronic immobilization stress results in dendritic hypertrophy in the basolateral nucleus of the amygdala (BLA) in male rats (Vyas et al. 2002). We have studied the sex differences and the role of estradiol in stress-induced neuronal remodeling in limbic brain regions (Mitra et al. 2002, 2003).

Subiculum, a critical structure of hippocampal formation is involved in the hippocampal-dependent cognitive functions. Lesions of subiculum decrease cell density and dendritic atrophy of hippocampal and entorhinal cortical neurons (Govindaiah et al. 1997, Latha Devi et al. 2003, Shankaranarayana Rao et al. 2001d, 2003h). Such morphological changes following subicular lesions are correlated with altered hippocampal theta activity and learning deficits (Laxmi et al. 1997, 1999, 2000). Chronic gluatamate ingestion also induces neuronal plasticity in hippocampal CA1 and CA3 pyramidal neurons (Shankaranarayana Rao et al. 1999d).

B.Dendritic spine plasticity

Dendritic spines are tiny, specialized postsynaptic receptive sites that cover the surface of many neurons and they serve as major targets for excitatory synaptic inputs onto principal neurons in the hippocampus, the neocortex and other brain regions. The density of dendritic spines over any given length is subjected to wide fluctuation depending on variety of environmental factors, electrical stimulation of afferent pathways, sensory deprivation, stress, social isolation, learning, hibernation, aging, hormones and radiation.

In the CA1 region of the hippocampus, the dendritic spine density varies by 30% or more, over a 5 day estrus cycle of the adult female rat (Woolley et al. 1990). Other studies have shown that the shape of spines, in particular the length and diameter of the neck changes during the course of neuronal development and in response to behavioural or environmental cues such as light, social interaction or exploratory motor activity. Recent studies using light and confocal microscopy of spines indicate that excessive synaptic activity leads to the formation of new spines. Papa and Segal (1996) have found an increase in the spine density up to 60%, following enhanced spontaneous activity in cultured hippocampal neurons. Alterations in spine density were also observed in various pathological conditions such as brain tumour, alcohol consumption, and undernutrition and sleep deprivation (Ramesh et al. 1999). In addition, changes in both spine density and the appearance of abnormal spines have been reported in Down's syndrome and mental retardation.

Recent studies have thrown more light on the training induced changes in dendritic spine density in different regions of the brain. Changes in synaptic efficacy may be accomplished by alterations in synaptic density, which could change the strength of input to a particular neuron. Chang and Greenough(1984) have shown increases in the number of shaft and spine synapses, 10-15 min after induction of long-term potentiation (LTP), which persist up to 8hours. Desmond and Levy (1986) have also found a significant increase in the density of spines following LTP in the rat hippocampal dentate gyrus. We have also demonstrated a significant increase in the number of spines in different categories of dendrites in hippocampal and motor cortical neurons (Shankaranarayana Rao et al. 1998a, 1999b).

C.Synaptic Plasticity

The synaptic plasticity denotes long-term changes in synaptic potency resulting from transient changes in synaptic activity. It includes the growth of new synapses or the activation of silent synapses, as well as changes in the efficacy of existing synapses. The nervous system of mammals retains the ability to modify the number, nature and level of activity of its synapses throughout the animals' life span. Synaptic plasticity is maximal during development and is expressed after maturity in response to external or internal perturbations. Synaptic density in various regions of the brain, including neocortex and hippocampus are altered in different conditions such as alterations in hormonal levels, undernourishment, aging and Alzheimer's disease, exposure to drugs such as nimodipine, 5-hydroxytryptamine (5-HT) receptor agonist and antagonists, visual training and cerebral ischemia or lesions (Claverly and Jones, 1990).

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Our studies have shown an increase in the number of synapses in lucidum, radiatum and moleculare layers of CA3 hippocampal region and molecular layer of the motor cortex following self-stimulation rewarding experience (Shankaranarayana Rao et al. 1999a).

In addition, alterations in synaptic number, size and shape have also been reported following a number of manipulations, such as stimulation, long-term potentiation (LTP) and NMDA administration. Similar synaptic changes have also been noted following behavioural manipulations such as learning, imprinting, avoidance training, and environmental enrichment. Ben-Ari and Repressa (1992) reported that brief high frequency stimulation induces LTP and mossy fiber sprouting in the hippocampus and suggested the usage-dependent structural rearrangement of the neural network, a model for plasticity in the adult nervous system.

Changing the strength of connections between neurons is widely assumed to be the mechanism by which memory traces are encoded and stored in the central nervous system. The synaptic plasticity and memory hypothesis states "activity-dependent synaptic plasticity is induced at appropriate synapses during memory formation and is both necessary and sufficient for the information storage underlying the type of memory mediated by the brain area in which that plasticity is observed." A century ago Mueller and Pilzecker(McGaugh, 1999) proposed that the neural processes underlying new memories persist in a short-lasting modifiable state and then, with time, become consolidated into a relatively long-lasting state. Later, Hebb (1949) proposed that the first stage of the "dual-trace" memory system is based on reverberating neural circuits and that such neural activity induces lasting changes in synaptic connections that provide the basis for long-term memory.

There are various forms of synaptic plasticity, differing with respect to their persistence over time and their underlying induction and expression mechanisms. The best known of these is LTP (Bliss &Lømo, 1973), in which synaptic potentials, evoked by low-frequency stimulation, are observed to increase in amplitude as a consequence of brief patterns of high-frequency stimulation or the pairing of presynaptic activity with postsynaptic depolarization. LTP is operationally defined as a long-lasting increase in synaptic efficacy in response to high-frequency stimulation of afferent fibers. The increase in synaptic efficacy persists from minutes to days and is thus a robust example of a long-term increase in synaptic strength. LTP was first observed in the rabbit hippocampus (Bliss and Lomo, 1973), but has since been observed in numerous brain structures, including the cortex, brain stem, and amygdala. Most forms of LTP are glutamatergic and the most prominent form is induced following activation of the *N*-methyl-D-aspartate (NMDA) receptor. A train of 100 stimuli at 100 Hz can evoke a long-lasting potentiation of synaptic transmission in neurons of selected structures in the brain. This potentiation is called long-term potentiation.

Long-term depression (LTD) is a lasting activity-dependent decrease in synaptic efficacy that was first discovered in CA1 in vitro by Lynch et al. (1977). Depotentiation, the reversal of LTP, is also observed in vivo and in vitro. LTD requires low rate about 1 Hz stimulation for long periods (10-15 minutes). This pattern of activity depresses the activity for several hours. Having the capacity to bidirectionally modify synaptic efficacy improves the potential fidelity of memory recall in associative memory. Current work suggests that LTD is a reversal of LTP, and vice versa, and that the mechanisms of LTP and LTD may converge at the level of specific proteins. Both LTP and LTD require activation of NMDA-type glutamate receptors. The major determinant of whether calcium entry via the NMDA receptor causes LTP or LTD appears to be the amount of unbound calcium inside the postsynaptic cell. Small increases in intracellular calcium set off a series of events that leads to depression, whereas large increases trigger potentiation. The different effects of low and high levels of calcium may result from the differential activation of calcium-dependent protein kinases and phosphatases in the dendritic spines, sites of excitatory synapses.

Dendritic spines are morphological specializations that receive synaptic inputs and compartmentalize calcium. Over the past two decades many studies have demonstrated changes in the morphology of spines after LTP, such as enlargements of the spine head and shortenings of the spine neck. Biophysically, these changes translate into an increase in the synaptic current injected at the spine, as well as shortening of the time constant for calcium compartmentalization. In addition, recent online studies using time-lapse imaging have reported increased spinogenesis. This indicates a strong correlation between synaptic plasticity and morphological changes in spines, although at the same time, there is no evidence that these morphological changes are necessary or sufficient for the induction or maintenance of LTP.

It has often been pointed out that synaptic plasticity displays physiological properties that are highly suggestive of an information storage device (Bliss &Collingridge 1993). An increase in the population spikes in dentate gyrus induced by perforant path stimulation has also been observed on the completion of learning. Training induced potentiation of population spikes in CA3 neurons of hippocampus occurred with the advance of learning and suggested that LTP in CA3 neurons induced by learning may be related to memory storage. The LTP can set in motion a cascade of events that include changes in gene expression, sprouting of fibers and the establishment of new synaptic contacts.

Activity dependent synaptic plasticity has been implicated in a variety of physiologically and behaviorally induced changes in neuronal organization both during development and adulthood. Although extensive information is available about the mechanisms of synaptic plasticity in the adult mammalian brain, a coherent understanding is yet to emerge.

D. Cytoskeletal Plasticity

Experience-dependent structural plasticity is now a well documented phenomenon, however the central question about how functional demand operates at the cellular level to influence the expression of cytoskeletal proteins, namely, neurofilaments, still remains to be answered. Neuronal growth, whether it is dendritic growth or the formation of new synapses are found to be accompanied by changes in

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the expression of cytoskeletal proteins, which are responsible for the structural maintenance of neurons.Neurofilaments are neuron-specific intermediate filament proteins, which constitute a major component of the neuronal cytoskeleton and play a critical role in determining shape and volume of neuronal processes including complex dendritic arborization and axonal caliber. It has been suggested that the concentration of neurofilaments can serve as indicators for axonal development, neuronal plasticity, neuritic sprouting and nerve fiber regeneration.Few studies have also correlated the expression of neurofilaments and neuronal maturation during development.

Several studies have shown that under normal conditions the neurofilaments in the neuronal perikarya and dendrites are non - phosphorylated while in axons they are phosphorylated. Aberrant neurofilament phosphorylation in the soma of the ventral horn neurons of neonatal rat spinal cord is observed following exposure to cerebrospinal fluid (CSF) of patients suffering from amyotrophic lateral sclerosis (ALS). Hyperphosphorylation of neuronal soma suggests an initial stage of degenerative changes occurring in the motor (ventral horn) neurons following exposure to circulating factor(s) in the CSF of patients with ALS (Rao et al. 1995, Shahani et al. 1998, 2001).

Our studies have revealed an increased immunoreactivity for phosphorylated and non-phosphorylated forms of neurofilaments in self-stimulation experienced rats in hippocampal and motor cortical pyramidal neurons (Shankaranarayana Rao et al. 1997, 2003). The increased dendritic arborization after self-stimulation experience ((Shankaranarayana Rao et al. 1993, 1994) was associated with an enhanced expression of neurofilament proteins. These findings suggest a close relationship between the expression of cytoskeletal proteins and experience-dependent structural changes.

III. Neurochemical Plasticity

Neurotransmitters are known to play a critical role in the regulation of neuronal cytoarchitecture. Recent studies have begun to realize that neurotransmitters are not only involved in information coding but may also play important roles in defining the structure of circuits in which they participate. Various neurotransmitters such as acetylcholine, noradrenaline, dopamine, gamma-amino butyric acid (GABA), glutamate, serotonin, somatostatin and neuropeptides are found to regulate the neuronal structure in the developing and adult nervous system (Mattson, 1998). The importance of noradrenergic innervation during the development of the cortex is suggested by the experimental findings, which show that the ocular dominance shift is abolished when noradrenaline is depleted by 6-hydroxydopamine (6-OHDA). Interestingly, the plasticity was restored by microinfusion of noradrenaline into the cortex.The depletion of serotonin in developing rat somatosensory cortex has been shown to delay the barrel formation. Furthermore, the rate of maturation of cortical neurons was dependent on the presence of serotonin and noradrenaline. Monoamines and acetylcholine are involved in the formation of specific dendritic morphology, lamination of cortex or the formation of topographical afferent and efferent projections.

The intracellular concentration of dopamine and serotonin has been shown to vary inversely during the growth of neurons. Several aspects of postnatal striatal development are altered by the neonatal depletion of dopamine by reserpine or destruction of dopaminergic afferents by using 6-OHDA. In addition, dopamine and serotonin inhibit neurite elongation and elevate intracellular calcium when applied directly to neurons in vitro. This may constitute a means of stabilising dendritic growth during synaptogenesis in vivo. When GABA and its potentiator diazepam were added to growing neurons, the outgrowth of both the axon and dendrites was suppressed. It was observed that somatostatin enhances the neuritic outgrowth in regenerating neurons.Our recent studies have correlated the relationship between increased dopamine metabolism (Lakshmana et al. 1998a, 2003) and altered dendritic morphology in hippocampal and pre-frontal cortical pyramidal neurons in adult monkeys following chronic (-) deprenyl administration (Lakshmana et al. 1998b, Shankaranarayana Rao et al. 1999c).

Glutamate is the predominant excitatory neurotransmitter and it plays a critical role in the morphological changes following LTP. Glutamate was also found to specifically affect the cytoarchitecture of dendrites of hippocampal pyramidal neurons in a graded manner, which suggests that glutamate may be involved in establishing hippocampal circuitry during the brain development; maintaining and modifying circuitry in the adult and inducing neurodegeneration in several disorders including epilepsy, stroke and Alzheimer's disease.

Neurotransmitters are prominent candidates for trans-cellular signals that influence the development of the CNS. Govindaiah et al. (2002) have examined the effect of glutamate on survival, differentiation and metabolic activity of cultured rat retinal ganglion cells at 3 days in vitro. Retinal cultures from neonatal Wistar rats were treated with glutamate for 48 h. The metabolic activity was markedly increased in the retinal ganglion cells exposed to 20 μM glutamate. This was accompanied by an enhanced survival of these neurons. The number of differentiated retinal ganglion cells as determined by microtubule-associated protein-2 labeling was significantly increased following exposure to low but not higher doses of glutamate. The effect of glutamate on the metabolic activity and differentiation was blocked by tetrodotoxin. Dopamine and GABA also modulated RGCs survival, diiferentiation and metabolic activity (Govindaiah et al. 2003). These results show that neurotransmitters have a significant effect on survival, differentiation and metabolic activity. An increase in the metabolic activity indicates an enhancement in the electrical activity.

Acetylcholine is known to enhance the neuritic outgrowth and in tuning the nerve growth cones. Acetylcholine esterase (AChE) can also regulate the neuritic outgrowth and survival of neurons. It has morphogenic and axogenic roles in the developing nervous system.Our studies have demonstrated an increased AChE activity following (-) deprenyl administration in hippocampus and pre-frontal cortex which was well correlated with an increase in the dendritic arborization in CA3 hippocampal and layer III cortical pyramidal neurons in adult monkeys (Lakshmana et al. 1998b, Shankaranarayana Rao et al. 1999c). It has also shown that chronic caloric undernutrion alters the AChE activity and biogenic amines metabolism in different regions of the primate brain (Govindaiah et al. 1994, Shankaranarayana Rao et al. 1994b, 2003e). Light deprivation also alters the levels of dopamine and noradrenaline in rats (Shelke et al. 1997).

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Our studies have demonstrated enhanced levels of biogenic amines, amino acids and AChE activity following self-stimulation (Shankaranarayana Rao et al. 1998b,c, Ramkumar et al. 2003a,b). On the other hand, different forms of chronic stress cause differential alterations of neurotransmitters in discrete regions of the rat brain (Ramkumar et al. 2003a,b, Shankaranarayana Rao et al. 2003a, Sunanda et al. 2000). We have also demonstrated that the stress-induced dendritic atrophy is mediated by corticosterone (Sunanda et al. 1998) and enhanced release of glutamate to hippocampus through entorhinal cortex (Sunanda et al 1997, 2000). Furthermore the biochemical changes are tightly correlated with the structural changes following either rewarding or non-rewarding experiences. These results demonstrate the role of neurotransmitters in altering the morphology of neurons in adult nervous system. The correlation between neurochemical and structural changes indicate that neurotransmitters are likely to play an important role in bringing about structural changes in the adult brain for functional adaptation.

IV. Behavioural Plasticity

The importance of experience for the development of behavior and for the maturation of the central nervous system is widely recognized. A growing number of studies have provided evidence that recovery of functions following brain injury in early life does not necessarily occur spontaneously but rather depends on the opportunities that the environment provides for stimulation during the course of development. The recognition that environmental stimulation may be a potent factor governing an organism's capacity to compensate for brain injury raises certain hopes for the treatment of brain injury and also poses some basic questions about the mechanisms by which functions are restored in a damaged nervous system. Pharmacological manipulation of neurotransmitter systems may regulate the neuronal morphology and behavioural plasticity (Shankaranarayana Rao and Raju, 2001a).

Landsdell(1953) subjected rats to anterior or posterior cortical ablations as infants or as adults and kept them in enriched environments for 3 months to determine if such rearing would offset the expected behavioral deficits. Later studies have analysed the effects of cortical lesions in rats raised under impoverished conditions as compared with enriched environment. Taken together, these studies provided support for the idea that enriched rearing conditions could ameliorate behavioral deficits following bilateral cortical lesions performed in weaning rats. Beneficial consequences of environmental complexity have been most clearly shown in studies in which brain-injured rats were raised in enriched environments and then subsequently tested on maze problems.

Enriched environment (EE) has been shown to facilitate the locomotor activity, exploration and spatial behavior as well as solve the spatial problems. It was shown that animals reared in complex environments had thicker hippocampus. Further, it was demonstrated that in adult mice living in an enriched environment there was an increase in neurogenesis in the dentate gyrus of the hippocampus. Long-term environmental enrichment leads to increased neurotrophin levels in the rat brain and it also increased mRNA expression in the hippocampus for NGF, BDNF, and NT-3.

Previous studies suggest that enriched environment induces neuronal plasticity by producing morphological changes in the hippocampus; increase in the hippocampal thickness, dendritic arborization and accompanied by behavioral improvement in spatial learning tasks. EE during development is protective against lead-induced neurotoxicity. At the same time enriched living conditions in combination with daily rehabilitation promote improved forelimb motor function and enhanced dendritic growth after focal ischemic injury. Furthermore, enriched environment attenuates cognitive deficits and preserves tissue integrity in a traumatic brain injury model. The mechanisms by which EE attenuates these cognitive deficits are unknown and this phenomenon is likely to be multifactorial. Our studies have shown that EE ameliorates the stress and subiculum lesions induced cognitive deficits.

Our earlier studies have demonstrated the regeneration of olfactory tract induced behavioural plasticity (Munirathinam et al. 1997). It was also shown that spinal cord ischemia induced spinal motor neuron degeneration and locomotor deficits can be attenuated by (-) deprenyl (Kiran et al. 1998, Ravikumar et al. 1998). In addition, transplantation of embryonic tissues in to lesioned adult hippocampus and substantianigra resulted in the recovery of functions such as learning and self-stimulation behavior (Rao, 1996). Subicular lesions are known to impair spatial learning abilities in rats (Laxmi et al. 1999). These studies suggest that neuronal plasticity constitutes a potential mechanism for the recovery of functions after brain injury. Furthermore, we have demonstrated that prior self-stimulation experience facilitated the operant and spatial learning tasks in adult rats (Yoganarasimha et al. 1998) and self-stimulation also ameliorates fornix lesions induced behavioural deficits (Yoganarasimha and Meti, 1999, Yoganarasimha et al. 2002). In addition, chronic restraint stress is known to alter the acquisition and retention of spatial memory task in rats (Sunanda et al. 2000). Very interestingly, the stress-induced cognitive deficits and cholinergic dysfunctions are reversible following 10 days of self-stimulation rewarding behavioral experience (Ramkumar et al. 2003a,b; Shankaranarayana Rao 2003b). Further research should aim for strategies for amelioration of behavioural deficits in various neurodegenerative disorders.

V. Experience-dependent plasticity

The ability of the nervous system to wire and rewire itself in response to lasting changes in experience has known as experience-dependent plasticity. The brain is able to remodel its connections in order to adjust the organism's response to changing conditions. The brain shows greatest plasticity during early development when connections between neurons are being made for the first time. The connections are often formed under the guidance of sensory experience. Work into experience-dependent plasticity provides a link between the synaptic mechanisms studied in vitro and the behavioral studies on learning and memory. One of the most spectacular properties of the human brain is its ability to store information. Underlying all memories are plastic changes in the ways in which neurons communicate with one another. Our investigations are designed to gain insight into how neurons change as a result of experience and whether those changes could be the mechanisms by which we learn and remember. By attaining this goal, we can begin

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to see how learning and memory could be improved, while at the same time identifying approaches that could prevent or reverse learning impairments.

Examining the neuronal basis of learning and memory is a daunting task, as there are almost innumerable forms of learning and memory, and potentially as many ways for neurons to change their function. We are testing the hypothesis that long-term potentiation (LTP), an enduring change in the strength of communication signals between neurons, is the basis of learning in the mammalian central nervous system. Because this phenomenon is induced by brief, high frequency activation of synaptic afferents and changes synaptic function for relatively long periods of time, it makes an attractive model for both learning-induced plasticity and experience-dependent plasticity.

Understanding the basis of neural plasticity has been the goal of considerable research. Recent studies demonstrated the experience dependent structural changes in the presynaptic and post synaptic elements. The stage has been now set to accept the concept of neurogenesis in the adult neural system (Thomas and Raju, 2003). Some of the most detailed studies of experience dependent plasticity have been performed in the rodent barrel cortex. Manipulations of the sensory inputs such as, clipping the whiskers can change the receptive fields of cortical neurons. Robust experience dependent plasticity has been observed within 24 hrs of whisker clipping. A research problem of this complexity requires a variety of approaches and techniques. We have chosen to use morphological, biochemical, and behavioral and electrophysiological techniques to assess learning and synaptic plasticity.

Molecular basis of plasticity

The molecular mechanisms involved in neuronal plasticity have been a topic of intensive research in recent years. The gene knock out technology further enhanced the understanding of the role of genes and proteins in synaptic plasticity. The occurrence of experience dependent, CaMK II dependent LTP phenomenon has been reported in the hippocampus and in many cortical areas.

In order to fully understand the functional interactions of multiple physiological, and ultimately molecular, factors it is necessary to study neuronal plasticity at the organism level. Gene targeting offers an alternative way of investigating the relationship between synaptic plasticity and memory. Our collaborative research has significantly contributed the role of different signaling molecules in neuronal functions. We have studied the role of NMDA receptors in structural plasticity (Shankaranarayana Rao et al. 2001a, 2003c) and in stress (Nair et al. 2003). BDNF is critically involved in growth and maintenance of hippocampal and cortical neurons (Shankaranarayana Rao et al. 2000). Hayashi et al. (2003a,b) have shown that p21-activated kinase (PAK) is associated with the postsynaptic density and also regulates the spine density of cortical neurons. In addition, we have also studied the role of calcineurin on dendritic arborization and spine morphology in knockout mice (Shankaranarayana Rao et al. 2000). Furthermore, absence of presinillins causes synaptic dysfunction and neurodegeneration (Saura et al. 2003). The above studies have provided the cellular and molecular basis of neuronal plasticity in hippocampal and cortical neurons in development, synaptic plasticity and in neurodegenerative disorders, namely aging and stress.

Activity dependent synaptogenesis is thought to be mediated by gene expression and protein translation. In adult animals, whisker stimulation causes upregulation of immediate early-genes and experience-dependent plasticity paradigms cause CRE-mediated gene expression such as BDNF. Activity dependent up regulation of BDNF leads to spine growth and recruitment of new synapses and proposed to enhance dendritic morphogenesis (Govindarajan et al. 2003a-c, Shankaranarayana Rao et al. 2000). Enhanced synaptic density and changes in expression of fos protein associated with a complex motor learning task has been reported.

There is increasing evidence that neurotrophins are involved in processes of neuronal plasticity. The neurotrophins and their presynaptic trk receptor activation contribute to the activity dependent plasticity by various means; through modifications of presynaptic machinery locally, regulation of synaptic protein levels and transcriptional regulations. There is increased evidence of neurotrophins and their receptor signaling in the production of LTP and activity-dependent plasticity associated with learning. BDNF expression and trkB signaling have been associated with dendritic and synaptic restructuring by means of regulating spine dynamics, functional maturation of presynaptic terminals, dendritic growth, triggering AMPA receptor proteins and in activity dependent conversion of silent synapses into functional ones. We have shown that BDNF is critical for the normal maintenance of dendritic arbors and synapses in hippocampal and cortical neurons (Govindarajan et al. 2003a,b, c, Shankaranarayana Rao et al. 2000). We have also shown that stress induces alterations in BDNF and glutamate receptor mRNA expression in the hippocampus (Mitra et al. 1999).

Recent research has shown the existence of neural stem cells in the sub ventricular zone, olfactory bulb and in the dentate gyrus of hippocampus which give rise to new neurons and glial cells. It is postulated that the new cells undergo differentiation to be incorporated into the existing functional network and allow a strategic increase in network complexity may be to accommodate the continued modulation of input pathways. Thus it appears that behaviors can induce structural changes and changes in structure can subsequently change or at least affect subsequent behavior.

Summary and Conclusions

Neuronal plasticity is an extraordinary property of the brain and refers to the morphological, biochemical, behavioral and electrophysiological alterations in both the adult and developing nervous system. Thus, it is becoming increasingly clear that a regenerative and continuing mechanism for adaptive reorganization of the brain occurs because of the property of neuronal plasticity. This unique property of the nervous system may be responsible for the recovery of functions in several brain disorders including stress, anxiety, depression, aging, epilepsy and mental retardation. Stress is a condition that seriously perturbs physiological and psychological homeostasis, resulting in disorders

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ranging from anxiety to post traumatic stress disorder. Severe traumatic or repeated stress can result in long-term deleterious effects leading to depression and cognitive deficits.

Prolonged stress induces learning and memory impairments, dopaminergic and cholinergic dysfunction, dendritic atrophy, decreases neurogenesis and long-term potentiation (LTP), alters sleep-wake cycle, and enhances degeneration of the hippocampal and medial prefrontal cortical neurons. These degenerative changes in the brain are associated with decreased neurotrophic factors mainly brain-derived neurotrophic factor (BDNF), alterations in NMDA receptors and tissue plasminogen activator (tPA) in the hippocampus. Thus, stress leads to regressive plasticity in the hippocampal and cortical neurons, the crucial brain regions involved learning and memory. In contrast, brain stimulation rewarding behavioral experience (BSR) is known to increase dendritic arborization, spine and synaptic density, and increase neurotransmitter levels in the hippocampus. In addition, BSR facilitates operant and spatial learning. Further, exposure to enriched environment results in an increase in dendritic arbors, spines, synapses and enhances dopaminergic and cholinergic transmission, neurogenesis and facilitates acquisition and performance in several learning tasks. Thus, BSR and enriched environment induces a robust plasticity in the hippocampus and frontal cortex. In addition, the cholinergic and dopaminergic drugs are also known to induce progressive plasticity. Accordingly, we have used multiple novel approaches to restore stress-induced cognitive deficits by inducing progressive plasticity at multiple levels of neural organization; namely, (i) Intracranial electrical stimulation of rewarding experience, (ii) Chronic exposure to enriched enrichment, (iii) Pharmacological manipulation of dopaminergic and cholinergic transmitter systems, (iv) herbal drugs, (v) Enhancing BDNF levels in the forebrain regions including hippocampus and cortex, (vi) inactivation of amygdalar neurons, and (vi) Altering tPA levels.

Our results demonstrate reversal of stress induced cognitive deficits and depression, dopaminergic and cholinergic dysfunctions, decreased neurogenesis, hippocampal LTP and neurodegeneration by BSR / EE. In addition, enhancement of dopaminergic and cholinergic neurotransmission in the hippocampus and frontal cortex in stressed rats by administration of dopaminergic or cholinergic agonists, antidepressants or herbal drugs ameliorated the stress-induced learning and memory deficits. The overexpression of BDNF or inactivation of amygdalar neurons prevents stress-induced hippocampal neurodegeneration and ameliorates cognitive deficits. Interestingly, stress-induced altered synaptic plasticity is regulated by tPA. Thus, multiple strategies are necessary to prevent / restore stress-induced cognitive deficits by restoring hippocampal and cortical neuronal dendritic atrophy, cholinergic and dopaminergic neurotransmission, synaptic plasticity in the hippocampus in terms of restoring long-term potentiation and activation of resident stem cells in the adult brain.

Our recent studies have demonstrated the cellular and molecular basis of fragile X mental retardation and autism in transgenic and knockout mouse models. The selective synaptic manipulation by p21 activated kinase or metabotropic glutamate receptors ameliorated major symptoms of mental retardation and autism. Thus, understanding the mechanisms of plasticity will provide an insight in developing new therapeutic strategies in treating neurological and psychiatric disorders. In spite of recent developments in novel research approaches and technologies, the clear understanding of the pathophysiological basis of complex brain dysfunctions is yet to emerge. Accordingly, it is becoming increasingly difficult and challenging to treat several brain disorders including cognitive deficits.

Thus, it is becoming increasingly clear that a regenerative and continuing mechanism for adaptive reorganisation of the brain occurs because of the property of neuronal plasticity. This unique property of the nervous system may be responsible for the recovery of functions in injury as well as in various neurological disorders. However, the means to manipulate the promotors and inhibitors of neuronal plasticity are still in the process of development. Although single technique for directing cells, their processes, scaffolds in their milieu, their navigational methods and the usefulness of the synapses they make are still only a vision. However, basic research will provide promising plasticity enhancers for clinical trials. As with the potential mechanisms for restoration of neuromorphology, the functional effectiveness of any biological manipulation will depend in part on the strategies employed to optimally induce activity in neuronal circuits.

Our current research focuses on understanding the properties of neuronal plasticity in developing and adult nervous system by various behavioural manipulations and recovery of functions.

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Talk 3:

Soft Logic for Consciousness Science

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Abstract

In this paper, we develop a new mathematical language and logicthat can serve as the scientific basis for Consciousness Science, as it rigorously considers subjectivity in its foundation. By the development of a new coordinate system, we make a distinction between -0 and +0. This distinction enables us to present new kind of numbers, which we call soft numbers $a \times \bar{0} + b \times \bar{1}$. They are a combination of inner experience, which we call the zero line, and the outside experience, which we call the one line. We present here briefly elements of our new mathematical paradigm.

Keywords: Consciousness Science, Soft Logic, Necker Cube, Mobius Strip

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1. Introduction

One of the great challenges of consciousness science is to describe something, which fundamentally cannotbe described directly. The reason for this difficulty and inner contradiction is that when we talk about consciousness from within, it simply disappears. We can talk from its experience, but not inside it. This paradox of communication is solved in a surprising and unexpected way: the development of a new paradigm in mathematics and logic. We named it soft logic as an inspiration from a vision of the mathematician andphilosopher Gottfried Wilhelm Leibniz. Leibniz as a young researcherhad a vision [1] to discover and develop a mathematical language that will be more flexible than the limitations of the traditional dichotomy, which is based ontruth and falsehood.

Traditional academic research in mathematics is separatedinto fields and subfields(for example: logic, algebra, combinatorics, etc.). However, there is another holistic perspective that is looking on mathematics as one big whole. In this observation the mathematics are seen as a living organism [2]. The vitality of this abstract life ariseswhen we can see the mathematician as an inherent part of the mathematics creation (the science and the scientist). For doing thiscorrectly we need to insert a new dimension into the language that will enable us to include paradoxes as possible states of cognition, which lights the consciousness of the scientist.Soft logic also makes a connection between two or more opposites and suggests a new solution for logical conflicts and paradoxes [4, 5, 6, 7, and 8].

Example 1: When we look on a Mobius strip (**Figure1**) from a local point of view, it has two sides. However, from a global point of view the strip has one side only! This is a logical contradiction. We show that such geometriesare natural results in our mathematics; and we further show that this geometry represents aspects of human consciousness [11].

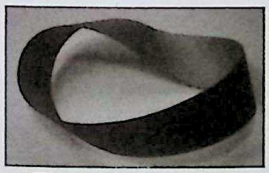

Figure 1

Example 2: When a hexagon is drawn with three diagonals (**Figure 2**), we get a picture that can be interpreted like a three dimensional cube.

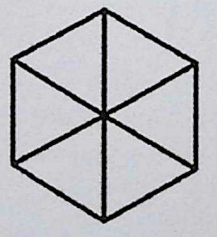

Figure 2

This is the Necker cube, which can be perceived in two different,but equally possible ways (**Figure 3**):

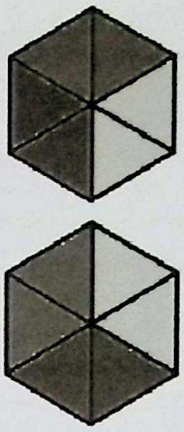

Figure 3

The ability of the observer to influence his observation is the base of our investigation of soft logic (when coloring the vertices, the center of the cube is sometime +0 and sometime-0, depending on the human point of view).

The traditional way that we present number in a Cartesian system XY coordinate createsa gap between phenomena and the observer. In soft logic we create a bridge between objectivity and subjectivity. For doing that we developed a new coordinate system of number.

2. Axioms and definitions:

According to traditional mathematics, the expression 0/0 is undefined. However, any number can be a solution to it since $a \times 0 = 0$ for any a. The fact that this exercise is considered as undefined opensup a new space for investigation that we call soft logic.

For a, b real numbers:

Axiom 1: Order : If $a < b$ then $a \times 0 < b \times 0$

According to soft logic we extend the zero from a point to a line, therefore there is a distinction between the multiplications of 0.Soft logic develops the infinitesimal world in a concrete way, thus enabling us to define order between infinitesimal numbers.

Conclusion:

Distinction : If $a \neq b$ then $a \times 0 \neq b \times 0$

Axiom 2: Addition : $(a \times 0) \dot{+} (b \times 0) = (a + b) \times 0$

Assuming that the multiplications of 0 are located on a straight line we can define addition similar to the addition of real numbers.

Axiom 3: Infinitesimal : $(a \times 0) \times (b \times 0) = 0$

The idea of the infinitesimal is that multiplication of infinitesimal numbers collapse to 0. The addition has a meaning, but the multiplication does not make any distinction.

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Definitions:

a. soft numbers:

We assume the there is a continuum of zeros that we symbolizeby$\overline{\mathbf{0}}$.(The zero axisor line)

1)A soft number is a number with the following form:

$$a \times \overline{0} \dot{+} b \times \overline{1}$$

Any soft number has an element from the real line which is the $\overline{1}$ line and an element from the $\overline{0}$ line (later we will not write the line above 1 or even the 1).Notice the new operation $\dot{+}$ that we define here.

The positive soft number system:

In collaboration with Yale Landsberg, we suggest a new monordinate system as presented in the following drawing (**Figure 4**): it starts from 0 to 1 horizontally, and then it turns90^0 from 1 to infinity.

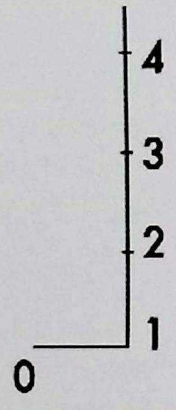

Figure 4

Lemma 1: There is one to one correspondence between the segment (0,1] and the segment [1, ∞)

Proof: let's look on the following function $f(x) = \frac{1}{x}$. This function createsa one to one correspondence between (0,1] and [1, ∞).

Q,E.D

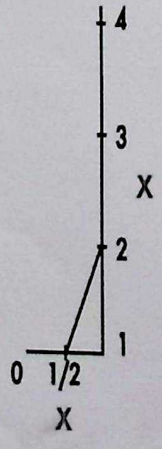

Figure 5

This is an example of a line between x=1/2and x=2. (**Figure 5**)

We can draw a line fromany x to 1/x (**Figure 6**).

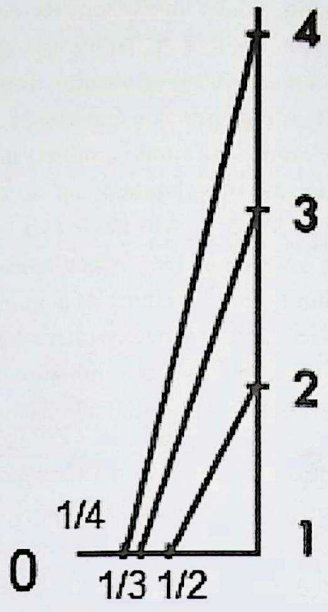

Figure 6

Lemma 2: All lines between opposite points intersect at one point.

Proof: Let us observe the following drawing **connecting** x with 1/x (**Figure 7**)

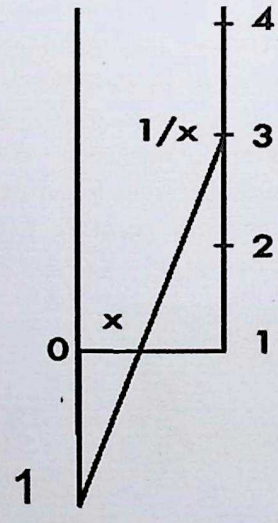

Figure 7

Let us apply the properties of similar triangles:

$$\frac{x}{1} = \frac{1-x}{\frac{1}{x}-1}$$

All the lines intersect at one point, which is located one unit below the 0. This same point denotes the beginning of the Cartesian coordinate.

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The height of 0 is 1, in relation to the Cartesian coordinate's origin point.We would also like to suggest extending this new coordinate system to the negative numbers (**Figure 8**).

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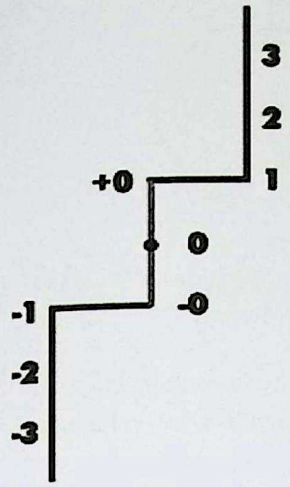

Figure 8

We have three zeroes.One zero is opposite to the number -1, but it is not identical with the zero opposite to the number +1. Hence, we suggest to denote the two different "zeroes" as -0 and +0.Furthermore, the discovery of the ***zero line*** enables us to find locationsof the multiples of zero.**(Figure 9)**

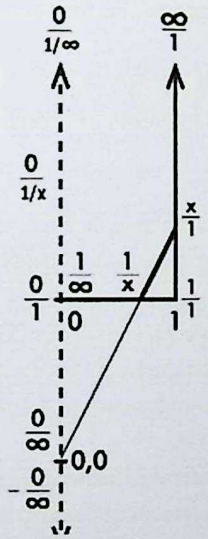

Figure 9

The discovery of the zero line enables us to realize soft numbers as a concrete infinitesimal world [12].

4. The algebra of Soft Numbers

A soft number is as an expression with the following form:$a \times \overline{0} \dot{+} b \times \overline{1}$, or just simply$a \times \overline{0} \dot{+} b$. For example,$2 \times \overline{0} \dot{+} 3$. We will denote by **SN** the set of all soft numbers:

$$SN = \{(a \times \overline{0} \dot{+} b) : a, b \in \mathbb{R}\}$$

We can add two softnumbers (following Axiom 2) by using the following rule:

$$(a \times \overline{0} \dot{+} b) + (c \times \overline{0} \dot{+} d) = ((a + c) \times \overline{0} \dot{+} (b + d))$$

Lemma 3: SNis a group under addition

(I.e. close under the operation, there is a unit, an inverse and associativity).

Multiplication of soft numbers(following Axiom 3) is carried out by the following rule:

$$(a \times \overline{0} \dot{+} b) \times (c \times \overline{0} \dot{+} d) = (ad \dot{+} bc) \times \overline{0} \dot{+} bd)$$

With these two operations, soft numbers create the Ring **SR.**

If $b \neq 0$ then $a \times \overline{0} \dot{+} b$ has an inverse:

$$\frac{1}{a \times \overline{0} \dot{+} b} = \dot{-} \frac{a}{b^2} \times \overline{0} \dot{+} \frac{1}{b}$$

Let's look on the set of all soft numbers$a \times \overline{0} + b$where $b \neq 0$.

With the operation of multiplication, itcreates a group that we name as SN*(0).

We can calculate the power and the root of soft numbers by the following equations:

$$(a \times \overline{0} \dot{+} b)^2 = 2ab \times \overline{0} \dot{+} b^2$$

$$(a \times \overline{0} + b)^n = nab^{n-1} \times \overline{0} \dot{+} b^n$$

$$\sqrt{a \times \overline{0} \dot{+} b} = \frac{a}{2\sqrt{b}} \times \overline{0} \dot{+} \sqrt{b}$$

$$\sqrt[n]{a \times \overline{0} \dot{+} b} = \frac{a}{nb^{\frac{n-1}{n}}} \times \overline{0} \dot{+} \sqrt[n]{b}$$

Let A be a matrix with soft numbers,$\overline{c}$be a vector with soft numbers, and B, D are regular matrices.

We want to solve a linear equation of the following form:

$$A\overline{x} = \overline{c}$$

$$A = B \times \overline{0} \dot{+} D$$

$$A^{-1} = -B \times (\overline{D})^{-2} \times \overline{0} \dot{+} D^{-1}$$

$$\overline{x} = A^{-1} \times \overline{C}$$

Inspired by Louis Kauffman's Zeroid idea [3], we define the star operation for the derivative of function f: **(Figure 10)**

$$f^*(x) = f'(x) \times \overline{0} \dot{+} f(x)$$

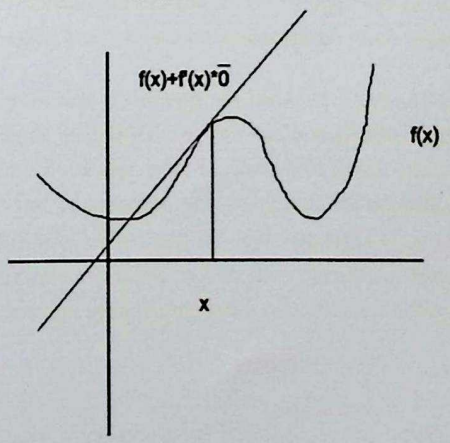

Figure 10

Lemma4:

$$(f + g)^* = f^*(x) + g^*(x)$$

$$(f \times g)^* = f^*(x) \times g^*(x)$$

The proof follows from the definition of addition and multiplication of soft numbers and from the known properties of differentiation.

Now let us look on at following calculation:

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$$(1 \times \overline{0} \dot{+} x)^2 = 2x \times \overline{0} \dot{+} x^2$$
$$(1 \times \overline{0} \dot{+} x)^3 = 3x^2 \times \overline{0} \dot{+} x^3$$

Lemma5:

$$(1 \times \overline{0} \dot{+} x)^n = nx^{n-1} \times \overline{0} \dot{+} x^n$$

Proof by induction:

$$(1 \times \overline{0} \dot{+} x)^{n+1} = (nx^{n-1} \times \overline{0} \dot{+} x^n) \times (x \dot{+} 1 \times \overline{0})$$
$$= (n+1)x^n \times \overline{0} \dot{+} x^{n+1}$$

Therefore, by using the Taylor presentation of a function we can prove the following general rule:

$$f(1 \times \overline{0} + x) = f'(x) \times \overline{0} \dot{+} f(x)$$

5. Conclusions

We presented the concept of soft logic, which may have many implementations. For example soft numbers can be present as points on the mubius strip. Inspired by Martin Hay's work [9,10]soft numbers and the new coordinate system enable us to describe the Necker cube property (**Figure 11**):

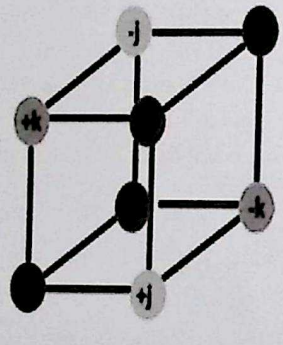
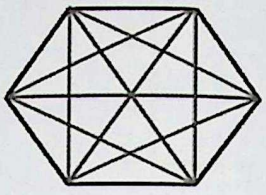


Figure 11

The possibility to see the Necker cube in two different ways is analogous to the measurement process in quantum theory and the influence the observer has on the measurement's result.

Consciousness appears when the scientist is able to observe both the reality and his observation on the reality. Soft logic develops the mathematical foundation and tools for this ability of investigation. The acceleration of including consciousness as a relevant part of the scientific investigation will enlarge the possibility that the investigation in science will be not about the objective phenomena but also of the awareness of the scientist to the universe.



Q.E.D

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Talk 4:

Joining the Dots: The Ladder of Cognition

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"In biology, it is easy to get interesting answers to questions one didn't ask."
- Ueli Schibler in Cell *169*, 1167, 2017

Abstract

Biology is rooted in the operation of consciousness. 'Life' cannot manifest and life-operations cannot be sustainedfor long without consciousness, which works as an active participating ground with its own specific operations within the systems. Processes of 'life' within the systems arerun by 'self', which represents consciousnesscustomized as the CEO for the systems. Information flow in the signal networking is executed through informational bio-molecules of cell and is regulated by different logic modules handled by operations of mind, self and life within the systems. Logic modules are overarched by operation of consciousness. This paper brings out the hierarchically nested labyrinthine structure of the cognitive organ, individual operations of the constituent members of the cognitive organ, and the dynamics in the ladder of cognition. The implications of this cognitive ladder in behavioral neuroscience, cell biology and systems science have been highlighted and its far-reaching influence on research in artificial intelligence, synthetic biology and psychosomatic medicine has been mentioned.

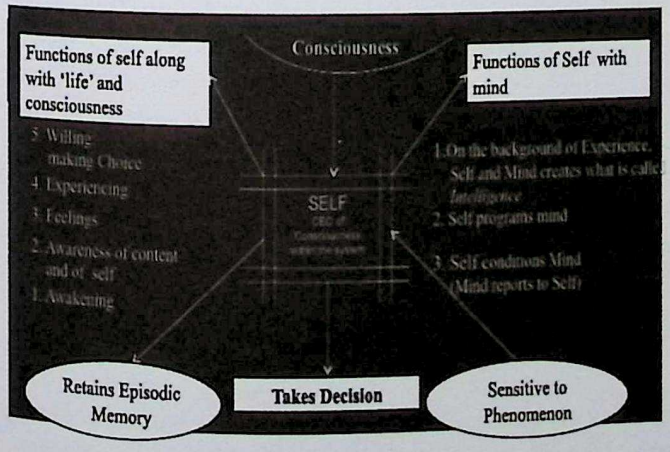
Introduction

Cognition is a universal phenomenon exhibited by all living systems. Cognitive apparatus(cognitive organ), cognitive processes and the objects and products of cognition are important issues in cognitive science. In spite of several experimental works in neuroscience and psychology, and considerable deliberation on philosophy of cognition, the theoretical framework overarching above three issues within the mould of science of informatics is conspicuous by its absence. The objective of this paper is to develop this theoretical framework, which could be applied universally in neuroscience, cell biology, psychology, sociology and evolution.

Consciousness is directly involved in three functions of the organism; cognition, emotion/feelings and volition/will. At the centre of all three functions, there is 'self'. It is the 'self' of the systems, which cognizes, and remains at the center of cognitive organ, cognitive processesin choosing the object of cognition, formatting information into knowledge, experiencing and executing the decision. Therefore, at the outset, we would offer a brief account of this self. This would be followed by description of the cognitive organ. The ladder of cognition with the 'dots'/ milestones and the operations would be dealt next. Finally, we would seetheir application in behavioral neuroscience, cell biology and systems science.

A brief account of Self in the Science of Consciousness

Self is that which evokes the sense of 'I', 'Me' and 'Mine' for the system. It is self, which feels and expresses emotion through available machinery of the systems. Self wills and opts for volition for the systems on behalf of consciousness. Self is at the centre of cognitive ladder in general, and cognitive apparatus of the systems in particular. This is because self is consciousness's executive representative within the system, Chief Executive Officer (CEO) appointed by consciousness to look after all activities of the systems and to lead the systems to its natural evolutionary goal.



Like consciousness, mind and life, self is also not observable, measurable reducible. Like them, self is nonlocal and is difficult to localize in time and space. However, self's operations are understandable. Some operations are joint venture of self, life and consciousness. Others are of self and mind. Decision-making process involves all ingredients of the psyche. However, self executes the decision. Self retains the episodic memory. Self is sensitive to phenomenon. Fig.1 outlines functions of the self within the system.

Scientists have recognized this operation of self first in nature within the self-organizing systems. The operation of self has achieved preeminence with appearance of life-operations and mind operations within the systems. The effort to localize operation of self in various states of brain through MRI recording has not yielded desirable result. Shifting position of self has been recorded with shifting brain states. Since the brain is a far complex system of hundred billion neurons and

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nearly two hundred to thousand billion glial cells, it is easier to concentrate on cellular self than on neuro-context self of the brain. Every individual cell of our body, including neuron and glia, has an uncanny sense of self (Mukhopadhyay, 2015). Our immune system works on the basis of division of self and non-self. At the preliminary molecular level, the membrane potential determined by ion-pumps brings the identity of ionic self of a cell. Derangement of ion pumps leads to misrepresentation or even no-representation of self at cellular level. Failure of proton pump leads to unmanageable intracellular edema, which when affects the vital organ like brain the subject deteriorates towards death. Also, MHC-I molecule expressed on the cell membrane works as biochemical representative of self within the cell. The distinction between self and non-self in cell biology is largely based on this molecule.

The Cognitive Organ

What is systems psyche in the context of systems science is the cognitive organ in the context of organic description of the systems. The constituents of this cognitive organ are consciousness, self, life, mind and information. The psyche, therefore, is not monolithic. It is made of five so-called 'puzzle' pieces. It is information, which connects mind in the cognitive apparatus with the physical world of energy, matter space and time. Every constituent of the psyche has its own specific operations and also hasjoint operation as well with other members of the psyche.

Consciousness: The Ground, Participating Ground and the Background:

Consciousness is the ground without any background. It is not a silent inert inactive ground. It is a supportive and participating ground. Self, life-processes and mind work autonomously under the umbrella of a ground unconditional consciousness. Consciousness offers autonomy to other players of the cognitive organ, which have achieved the desirable degree of perfection for the systems, and lets them free to operate. Consciousness intervenes only when there is conflict of autonomy, failure of any operation or their connectivity, or there is an effort to change or break the integration or the symmetry of the systems or there is an imperative of new creation, worldview formation or, in impetus of redefining or renewing system's consciousness. All these stimuli are responded by consciousness on a threshold for intervention. Functions of consciousness as the core constituent of cognitive organ are shown in the box below.

Functions of Consciousness

I. Maintains its own absolute independence
Like a spider it weaves the net but itself is outside the snare of the net.

II. Brings coherence and orders in the systems by
A. Passively supporting
Autonomous operations of 'self', 'life' and mind, which have achieved the reasonable degree of perfection as desired and decided by the systems.
B. Actively participating with 'self' and 'life',
in Awakening, Awareness, Feelings, Experience, Choice and Decision-making

III. Intervention: Consciousness intervenes at the time of
1. Conflict of autonomy
2. Failure of any autonomous operations or their connectivity
3. Challenge to system's integrity or symmetry
4. Taking decision in sync with the world, declaring the Worldview
5. Redefining and renewing system's consciousness
6. Necessity for a new creation

When consciousness intervenes, it takes all constituents of the cognitive organ of the systems psyche in confidence

Mind:

Mind is different from consciousness. It is through mind consciousness, self and life communicate with the physical world. Twenty one differences between mind and consciousness have been tabulated in one of my earlier papers (Mukhopadhyay, 2013). Mind's direct connection with consciousness is responsible for mind's fecundity. Bereft of consciousness, mind is sterile. Mind's infidelity originates from its direct connection with matter. Mind's strength comes from its connection with 'life'. Mind is responsible for the transit of signal to information and vice versa. Mind processes information as programmed by self. Mind retains semantic memory. In specific situation, mind can act as internal sense organ when it has direct access to nonlocal information.

Life:

Three unique features identify life-operations. The cardinal sign of life is homeostasis:certainty-uncertainty homeostasis, symmetry-asymmetry homeostasis and visible energy-dark energy homeostasis. Uncertainty is managed through access to new information, followed by application of inferential logic. Symmetry homeostasis is characteristic of only life. Life-form is unique in the sense that it can manage dark energy released in any

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operation and transform this dark energy into visible energy. It can also do the reverse. These functions could be observed in any systems, which is not alive. At present, there is no evidence for this statement but many phenomena like spontaneity, uncoupled action and negentropy as observed in the live system could be accounted by this assumption.

In my earlier paper on emergence of patterns in the complexity (Mukhopadhyay, 2016) and on systems psyche (Mukhopadhyay, 2016), I have described the life-self hierarchical and functional mosaic. Self-organization and life-organization, although differ, work together like yang and yin, as shown in Fig. 2. They maintain a tangled hierarchy.

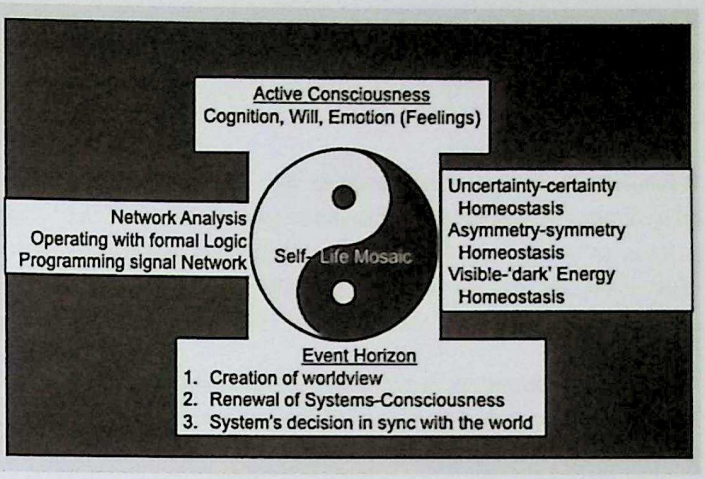

Fig. 2. Self-Life mosaic. Self and life maintain a tangled hierarchy between themselves like yang and yin. Characteristic functions of both are shown in the figure. Also, the event horizon for creation of worldview, system's decision in sync with the world and redefining and renewal of systems' consciousness.

Self:

Self's operations, as shown in fig. 2,are involved in (i) programming the signal network(ii) network analysis and (iii) application of formal logic.

Information:

Information connects the players of local science (space time, energy, matter) with the players of nonlocal science (consciousness, life, self, mind). Information works with other players of non-local domain through mind. Signal is space-time construct of information at the local level.

Event Horizon:

The event horizon is where self-organized critical instability, life organized critical instability and intervention threshold of consciousness meet. The observable events are (i) creation of worldview (ii) renewal of systems consciousness and (iii) system's decision in sync with the world.

'Dots' on the cognitive line

Cognition is a function of a conscious system. As mentioned, cognitive apparatus consists of consciousness, self, life, mind and information, which are also the ingredients of the systems psyche.

Our question is what do we cognize as a system? Is it a signal or information? Is it knowledge or experience? Or, we intuitively work with the wisdom in sync with the world?Is the system's cognition only signal-based? Or, is it information-based, knowledge-based, experience-based or wisdom-based? Or, the dots transit from one into other to reach its logical end?

If we state that signal, information, knowledge, experience and wisdom are the successive dots in the cascade build up during the process of cognition, then to connect these dots with specific operation is a hard task indeed. In this section we will describe these 'dots',spread over the line of cognition.

Signal: Signal is in the physical plane localizable in space and time. It is usually represented by energy within a specified space per unit of time. In mathematical language, it is expressed by frequency. Signal can be encoded, recoded and decoded within the physical system. However, the code cannot be *cracked* by any physical system. Also, signal has no intention or contextof its own.

Information: The meaning extracted from signal makes information. This is obtained by *cracking* of the code of the signal. The process transits from the local to the intangible nonlocal state. Being nonlocal, information is multileveled. In full form, Information has a measurable folium at the physical level, content folium, which works at the mental level and the intent folium working with the CEO of the system, the self. Connectivity with the self brings intentionality within information, and connectivity with mind generates the context of information.

Knowledge: Knowledge is that information which can be used without any further deliberation on it. Knowledge may be constructed from one single, or multiple interrelated information, and formatted by 'self' to achieve a specific architecture. Knowledge is also in the abstract intangible nonlocal plane, which is related to the systems. Architecture of knowledge is characterized by its specific invariant symmetry. Knowledge can act as a sensor for related information.

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Experience: When the specific invariant symmetry of knowledge, single or multiple, survives the challenges of symmetry breaking processes in life, transition of knowledge into experience begins. Following an experience, inside is out and the outside is in. Experience within is the reality outside, and while the invariance of symmetry remains.

What do we experience?We do not experience information or knowledge. In the computer language, the sensation we all feel is 'ambiguous'. Perception in the same language is 'probabilistic' although informative. Sensation and perception are, however, not experience.Concept formation is development of symmetry in the architecture of knowledge. Experience is deeper and broader than this and is dependent on operation of 'life'. What do we experience then? We experience the *design* in the invariance of symmetry in the architecture of knowledge arranged in layers asthe manifolds. Experience accumulates over time, as layers, on several domains of knowledge. As knowledge has sensor property, so the experience hascensoring property. Experiencecensors knowledge. Experience is, however, systems-bound, confined within the systems with limited theory value.

Wisdom: In the transition of experience to wisdom what the systems gain is dynamicity and this is achieved with active participation of consciousness. When the experience of the system gets synchronized with the worldit does not remain confined to one system. It concurs with the decision of a large number of systems and thusit becomesthen a worldview, commonly known as wisdom. Unlike all other previous 'dots'/milestones, the wisdom is intrinsically dynamic and has the ability to govern the systems.On every occasion it acts, it redefines the systems.However, unlike all other dots, wisdom always remains a dot, a point in space or a moment in time!

The above is a bottom-up description of the processes of the dots. Top down, from wisdom is created new design for experience. Supportive knowledge architecture is build up from the conceived design. Necessary information in the knowledge architecture interacts with mind to create appropriate signal, observable and measurable in the physical plane.

Alternative nomenclature for the dots

Signal, information, knowledge, experience and wisdom are the terms taken from linguistics. The terms could be reframed scientifically.

Using the term 'Information':

Signal can be said as space-time construct of information. Information is generally what we mean by Shannonian information. Knowledge could be called Gödelian information, information in the context of the whole and for the whole. Experience is related to information manifold. The pearl of wisdom might be called crystal information.

Using the term 'Knowledge':

Signals, like data, could be considered as factual knowledge. Information itself could be described as informative knowledge. Knowledge is what we getin the textbook as formative knowledge. Experience in this sense is transformative knowledge, while the wisdom may be called knowledge sublime.

Connecting the Dots

Operations and the Operators

Once the dots have been identified, the next step is to join the dots. I have proposed four specific operations in between five milestones, which together form the cognitive ladder. All four operations are in the abstract plane and not in the observable reducible physical plane. Transition of signal to information is carried out by Operation I, information to knowledge by Operation II, knowledge to experience by Operation III and experience to wisdom by Operation IV (Fig.3). The detail of individual operation is available in my recent publication (Mukhopadhyay, 2017).

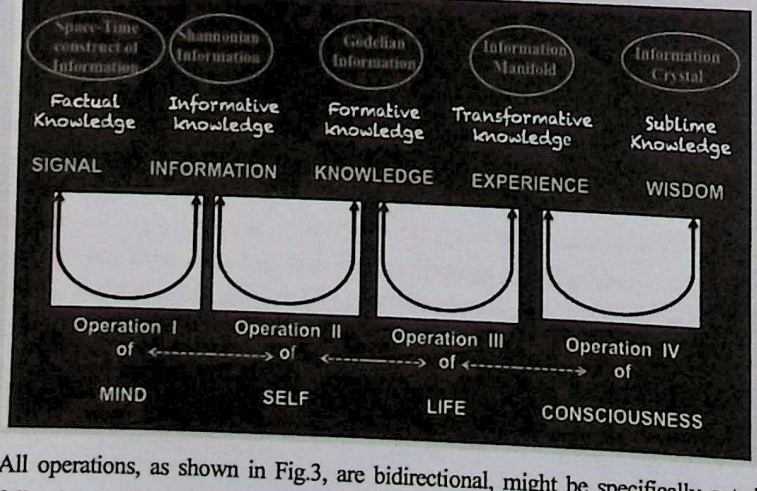

Fig. 3. The cascade of four specific operations. The operations are involved in the transit of signal (factual knowledge, space time construct of information) to wisdom (sublime knowledge, information crystal) and vice versa.

All operations, as shown in Fig.3, are bidirectional, might be specifically gated. As signal could lead to wisdom bottom-up along the ladder, following the ladder from top downthe wisdom of multiple systems, which is in sync with the world, may come out as a signal in the sensory physical domain within a live system.

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Operations are indeed processes. The question is, whether there is any operator for each of these specific operations?

We do not have any equipment, machine or physical device, which can crack signal code and extract meaning out of it except probably human mind or mind-like structure and processes in nature! For the transit of signal into information, the required operation probably has been so far labeled by humanity as mind operation in consensus and is being used in linguistics. Transition of information to knowledge requires a second operation, which is possible only in the systems,which has been autonomously run by self. To put the information in the context of the whole is possible only by this operation of self, which cares for the whole. Next, knowledge cannot transit to experience in an inanimate system. It requires operation of life. Only a living system can have experience accumulated over time stored in form of episodic memory. In contrast, semantic memory is stored inside mind. Sublimation of experienceinto wisdom is possible only within a conscious system. Involvement of consciousness makes the static experience of the system dynamic and helps to mature it in sync with the world. At the center of this cognitive ladder situated is self.

Therefore,it is clear now that the operations are carried out within the systems psyche and the operators are nothing but the constituent elements of the psyche, none of which are observable, measurable or reducible, although their effect are observable and measurable as different signals of different strength in the physical plane.

While the operators themselves are nonlocal, there is hierarchical location of their operations within the systems psyche. Mind reports to self for its operation. Self and life independently report to consciousness. All self, life and mind have direct access to consciousness. However, none of consciousness, self and life has direct access to physical plane. Each of them connects with the signals in the physical plane through the final common pathway of mind. That makes mind so important within the psyche. It is mind, which conceives information, delivers 'form' (as signal) and energy (? dark energy). 'Form' is construction of space and time. In this sense, information could be said as father, mind as mother while space, time and energy (? dark energy) are their three children (Mukhopadhyay, 2008). Dark energy homeostasis is a function of life.

Consciousness is not complex but the pathway from the signal to consciousness is complex. There are several factors, which make thiscognitive organ and the processes therein, complex hierarchical and labyrinthine. On the skeletonof a tentative pyramidal hierarchy, there is acascade of reporting system for mind, life and selfas described above. There are non-hierarchical interactions between the operators as well. The operations are selectively bidirectional and might be with gating. Besides, there is lateral entry to this ladder. For example, mind in specific situation can have direct access to information. Self remains ever sensitive to phenomenal inputs. Life is seen to sense directlythe symmetry alteration. Consciousness, in this context senses*attitude* and gets perturbed by theattitude of non-submission (? disobedience) and manipulation.Also, the currencies at different depths of nature intercept this cognitive ladder at several points.

Non-hierarchical interaction between the operators could result in complex outcomes. For example, interaction between mind and self with the background memory and experience leads to emergence of intelligence. The interaction between specific information with mind and life leads to emergence of emotional response.Because of presence of information, emotion is intentional while the feelings, handled by self, has no intention. Besides, there are completely new outcomes within the systems when self, life and consciousness act together with emergence of awakening, awareness, experience choice and decision as shown in Fig. 4 (Mukhopadhyay, 2017).

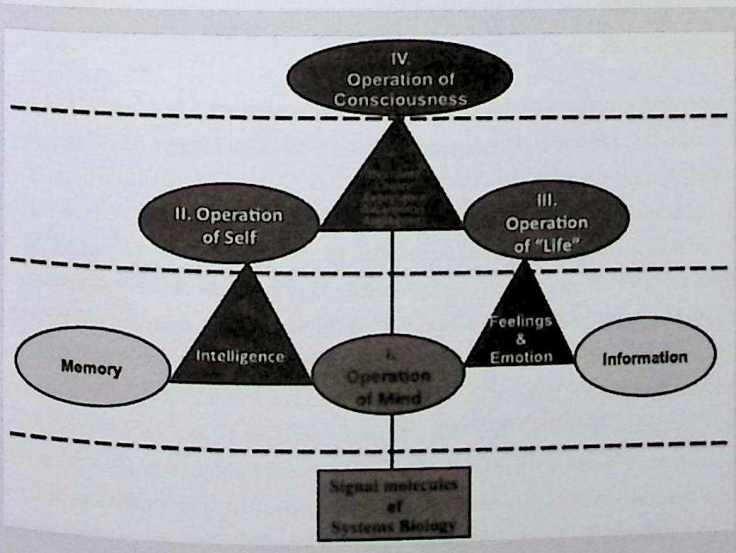

Fig. 4. Cognitive Labyrinth. Operation I (of mind) is immediately next to physical nest of molecular signal networks. In the same sub-physical nest, information, memory, intelligence and emotion work, where information is connected (not shown in the figure) with back-up memory. Operation II (of self) and III (of life) are in deeper sub-physical nest. Consciousness operates (operation IV) from the deepest nest. Only operation I (of mind) has connection with physical nest. Operation II, III and IV connect with physical nest through operation I which remains the final common pathway to the physical nest. Mind, Self and Life all have direct hotline connection with consciousness. Information, bottom-up, has no direct access to operation IV. Connections of information to operation I, II (not seen in the figure) and III are direct. Operation IV accesses information through operation II, III and I. Non-hierarchical interaction between the operations generates new additional outcomes. Operation III and I, along with information, generate emotion. Operation II and I, along with memory, generate intelligence. Awakening, awareness, experience, choice and decision are outcomes of joint operation II, III and IV.

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Consciousness, self, life, mind and even information are non-local. However, as said, within a conscious system their operation could be tentatively localized. Consciousness at the top and the mind at the bottom of the psyche, have hotline connection. Mind is trans-physical. It works across the border of physical nature and the operational currencies are information and signal. Operational site for self and life are sub-physical, sandwiched between operation of mind at the surface, and operation of consciousness at the deeper plane. Operation of consciousness is non-physical in the sense that it is beyond and far deeper than our concept of non-locality. Having defined the dynamic continuum of the cognitive ladder, it would be easier to investigate the steps from the signal to the will and from the will to signal, and from the neural firing to conscious behavior and from volition to its execution through neural signal network.

Brain and Conscious Behavior

Automated or reflex behavior, however complex it might be (e.g., pupillary reflex),does not need any active role of consciousness in their operation. Such reflexes have been offered autonomy in the organization since they have achieved a desirable degree of perfection for the systems. At present, although, we are limited to input-output behavioral analysis on the basis of mono-level neural networking,the link between the brain and conscious behavior is complex, not confined to one flat plane or level. Conscious experience is the result ofmulti-leveled andhierarchically stratified operations. Following the ladder of cognition as stated above, a multilevel dynamics is proposed to exist between sensory inputs and behavioral outputs that are conscious (Fig. 5). From the neural network to neural dynamics, whichinvolve astrocytes and deeper multi-leveled connectivity, the operation transits to fields of architectural symmetry for developing an invariance. This is followed by emergence of the design in this invariant architectural symmetry in this dynamics on an abstract plane, which is however supported physically by neural manifolds. This all happens with the active support of consciousness. Finally, consciousness actively intervenes with its 'will' for the volition of the conscious behavior.

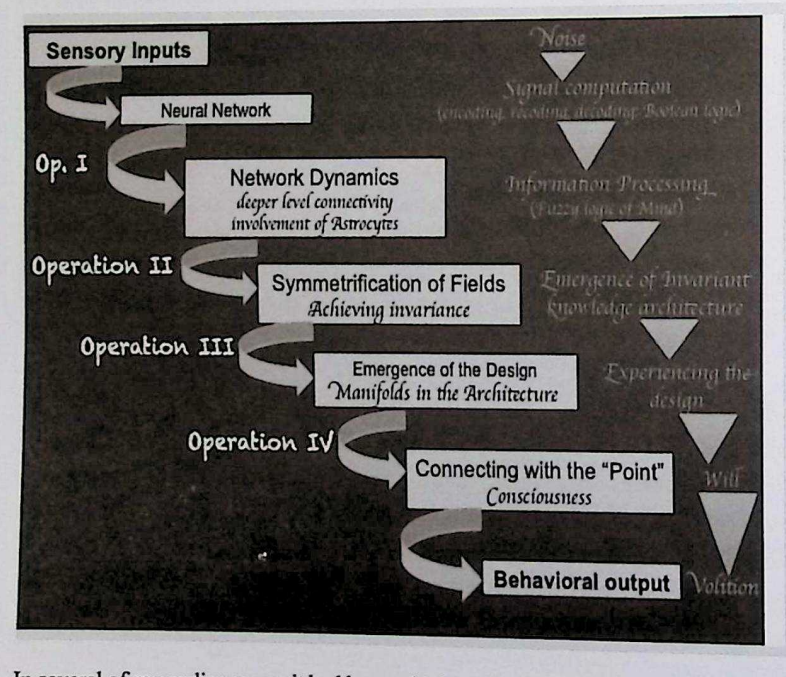

Fig. 5. The layers between the brain and conscious behavior and the processes between sensory inputs and behavioral outputs correspond to the ladder of cognition. The cascade begins with the signal and layers up to neural code, to information on-board, symmetry concord, neural multifold mode. Finally, consciousness's accord leads to behavioral output.

In several of my earlier papers it had been said that when information geometry concurs with the geometry of neural manifold, there is generation of experience. In the light of this ladder of cognition, let us analyze the statement. Neural code (signal) is to be on board to behave as information. Concurrence is of several possible symmetries for developing a concord. Neural manifold has been described as "Neural Modes" (Gallego et al 2017). Therefore, it can be said that neural code (signal) on (Operation I) board develops (Operation II) concord with (Operation III) neural mode (manifold) to generate experience (Fig. 6). This surely offers the theoretical framework as required for organizing the experimental data (e.g., Pillai and Jirsa (2017), accumulated on this issue. It is worth noting that upto the level of generation of experience, consciousness actively supports all three operations. From signal to experience is thus a bottom up development with tacit active support from the top of a live conscious system. Almost effortless coupling of several natural oscillators within the brain come forward in architecturization of knowledge and emergence of a design in the neural manifolds. However, volition (behavior) requires a profound top-down activity where consciousness has to intervene for the accord: consciousness has to 'will' for the volition for expression of behavior to change the *rhythm of the brain and spinal cord* asa whole. This operation IV is under total command of conscious self as CEO of unconditional consciousness. Even when neural manifolds have already been ready with polite submission for transmission of the 'will' of consciousness, the execution depends on consciousness's ultimate wish to act in appropriateness of time to induce dynamicity into this experience. Through this operation local and nonlocal get unified. Through every conscious behavioral expression, the brain redefines its behavioral dynamics.

Cerebrospinal Fluid and Consciousness

Recently there is growing interest for establishing the relation between consciousness and cerebrospinal fluid (CSF). CSF is known traditionally to serve as lymphatic of the brain. However, what is missed in this idea is water in CSF. Interfacial water-lattice connects cellular information-manifold

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with extracellular information-manifold. Water lattice manipulates information geometry and informational-manifold. The flow of CSF and its drainage is influenced by respiration. " Inspiration is the driving force for CSF flow in humans (Dreha-Kulaczewski et al, 2015). Therefore, different varieties of breathing exercises (*pranayam)* help in cleansing the brain in term of traditional idea by encouraging CSF flow and drainage. Change of interfacial water lattice is also to be considered in this context.

At the deep contemplative phase of *samadhi,* respiration becomes still (*Kumbhak*) and the fine layer of CSF over the cortical brain becomes actively still. Water-lattice in this thin layer of CSF becomes conducive to achieve synchronization of consciousness inside and outside the brain. Following several such practices, *sahasrar* chakra might get open.

Dilate the Point of Death.The Hard Problem gets decimated

It is often said that the hard problem of consciousness cannot be solved till death. However if we follow the ladder of cognition and dilate the moment of death objectively, the hard problem is nearly decimated.

Functions of consciousness could be easily understood from behavior of unconscious patients. There is no volition (will), no feelings (emotion) and no cognition in unconscious patients. Cognition, emotion/feelings and volition are three textbook functions of consciousness.

When consciousness is 'out' of the loop in the systems brain, autonomous mind keeps on working as long as, biochemically, Ca^{++} ion channels are functional. The patient does not soil the bed. The patient retains his mind and sphincter control. Ca^{++} wave spread over astrocytic population of the brain keeps mind active within the brain. Information processing goes on. Whenever there is no 'thinking' or no mind function, no information, but only signal processing, astrocytes are not needed at all as in peripheral ganglion, and even in complicated papillary reflex pathway.

Mind is sterile without consciousness. Therefore, if consciousness is not regained, mind cannot continue its autonomous activity for long. Mind operation eventually ceases and there is no control of sphincters. The patient soils the bed.

When both consciousness and mind are out of loop from systems brain, the self in the brain continues its work with the support of proton pump within the cells. Autonomous function of self, bereft of consciousness and mind can continue as long as supporting Na^{+}/K^{+} pump continues.

With the failure of 'self' functioning within the systems brain, the patient develops endothelial leakage resulting in oedema, not manageable by diuretics, steroids or mannitol. Intracellular oedema of astrocytes and neuron makes 'life' impossible to continue its work within the brain. 'Life' eventually has to leave the systems body (Mukhopadhyay, 2015, 2016).

Cellular and Molecular Cognition

Could this ladder of cognition, as stated above, be of any help in systemization of signalingcircuits in the complex biological systems of a cell? Bacteria are small but not stupid (Shapiro, 2007). Like us connected through facebook, the bacteria have phagebook for social networking (Hynes and Moineau, 2017). Even the phages are seen to make group decision (Davidson, 2017). Definitely, this ladder of cognition has beenbuilding up a theory for cellular cognition and leading to new taxonomy for cells and molecules within the cells. The emergence of specific pattern of operations with identifiable characteristics like that of mind, self and life are important for this new taxonomy.

New taxonomy for Cells:

Behavior of cell depends on its cognitive status. Cells could be classified according to their position in this cognitive ladder. The cognition by a neuron and by a RBC, a platelet or a neutrophil is different. There are cells, which work on mostly signal. Their behavior is signal-based. Red cells and platelets of blood belong to this category. Ganglion cell of peripheral nervous system is also signal-based. Metabolic cells of liver, adipose tissue, endocrine or exocrine glands are 'informed' cells. Metabolomics is run by bio-informatics. Antigen recognizing cells, monocyte, histiocyte,tissue macrophages and, mirror neurons of cerebral cortex exhibit knowledge-based behavior. Memory lymphocytes, natural killer cell, regulator of pacemaker neurons are experienced cell. T-regulatory cell of immune system has regulatory power, which comes from wisdom. It seems that the wisest cell of the body would be the ovum, which handles millions of spermatozoa but allows penetration of only a few and eventually get fertilized by the best one. This taxonomy could be extended to classify cells all over the body. Even the population of neurons from peripheral ganglia to population of neurons of cerebral cortex could be classified on this basis (Mukhopadhyay, 2017).

New Taxonomy for Proteins

Any cognitive activity requires substance support from within the live-system. Cellular cognition is supported by their specific proteomics. Majority of the signal proteins are polypeptides. Folded proteins (as seen within cell membrane) are receptor proteins,

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which according to the ladder are 'informed' proteins. We are to find out how this secondary structure of protein has something to do with their information-carrying capacity. Tertiary structured proteins are 'knowledgeable' proteins as we see in enzymes, and the proteins which act as biosensor. The protein of inflammosome such as NLRP3 acts as sensor for pyroptic and necroptic pores (Braz and Dixit, 2016). NLRP6 is a multifaceted innate immune sensor (Levy et al 2017). Caspase 11 enzyme works as a sensor for cytoplasmic LPS (Shi et al 2014). As there are infinite variety of knowledge and experience, so there are similar number of symmetry and super-symmetry in protein structure within a cell.Quaternary-structured proteins are 'experienced' protein. For example, hemoglobin, which carries oxygen to cells all over body and by experience, it modulates its structural dynamics as and when it is necessary. Another example of quaternary-structured experienced protein is perforin found in T-killer cell or natural killer cells, which are experienced phagocytes.Experience offers proteins censuring property. Small HSPs (heat shock proteins) have multimeric crystal structure (Kim et al 1998), which with other heat shock proteins censors misfolded proteins. The enzymes involved in DNA repair mechanism are the trinity of ATM, ATR and DNA-PK (Blackford and Jackson, 2017) are also highly experienced proteins, all having quaternary structures. What controls those DNA-repairing proteins? The wise protein in this context is spherical protein of histone. The 'wisdom proteins' are usually found to be spherical. The sphere is a design where reflection symmetry, axial symmetry, and rotational symmetry are absolute invariant. Sphere occupies minimum space for the given volume of contents. Inside-out and outside-in phenomenon is possible by eversion of sphere. Sphere can be reduced to a point and a point can be enlarged to sphere. That is probably the reason why the histone in the nuclear chromatin is spherical in shape. Histone is outside the DNA-mRNA-Protein-DNA circularity. Recent research in cell biology suggests that the driver of DNA is in nuclear chromatin (Baumann, 2015, Therizols et al, 2014). Epigenetic mechanisms are wiser than genetic mechanism in nature!I leave this section asking a question for synthetic biology, Is it possible to developsuch spherical proteins in vitro?

Such Ladder is everywhere in Science

The ladder of cognition thus described is not only confined to linguistic, human behavior or the cellular system. Because cognition forms the very basis of all disciplines of science, such ladder is identifiable in several other spheres of science. There is similar ladder of sensation perception, concept formation, hypothesis generation, theory development, paradigm emergence and worldview formation. In the science of logic, the ladder begins with the Boolean logic (of signal), and steps up to fuzzy logic (of information in mind), formal logic (during knowledge formation by self), inferential logic (in experience generation by life) and hermeneutics (of conscious systems), which includes non-verbal communication as well. Even in mathematics, we see a similar ladder of arithmetic (and algebra), geometry, symmetry, super-symmetry and the ultimate point of origin. Similar hierarchy is observed in the ladder of organized systems. There are signal-organized systems, information-organized systems, knowledge-organized systems, experience-organized systems and consciousness-organized systems. Computation includes encoding (identified pattern), recoding (dynamic transformation of one pattern to another pattern) and decoding (presentation of pattern) of signal. There follows the ladder then; from computation of signal to mentation (cracking the code by mind), to formatting in the context of the whole (self), to homeostasis of the systems with inside-outside synchronization (life)and development of connection with the world (consciousness). In hierarchy of nature's currency too, parallel ladder exists; kinetic energy at the physical plane, potential energy (e.g., quantum potential, scalar potential) in intangible information plane, fields (e.g., quantum fields, scalar fields) studded with knowledge, manifolds stacked with experience, and finally at the deepest recess we find the originator medium, the ground.David Bohm's quantum potential,Ma and Wang's scalar potential (Ma and Wang, 2012) in the astrophysical realm are warehouse of information.

These ladders are not independent or exactly parallel to each other. All of the ladders are dynamic and intertwined with each other with several interacting points. These intertwined ladders in different domains of science could be of great help in developing a unified systems science.

Concluding Remarks and Perspectives

"Electrical and biological circuits are not directly parallel". Therefore, we are to go beyond physical circuitry (Andrianantoandro, 2017). We are to find the layers in between. Traveling with such intention, this paper has laid down the roadmap beyond this circuitry and has offered the outlines of bioinformatics from the point of physical signal to subjective experience and universal wisdom. This is a journey from the obvious to the apparently impenetrable. Fulfilling its objective stated at the beginning, the paper offers a theoretical framework overarching cognitive apparatus, operations involved in the cognitive process and the object and products in the cognitive environment.

Information is a very important constituent of psyche. On the other hand, even for a physicist, the whole universe seems full of information! However, that is twenty first century's dictation of science. Information is measurable. Anything that is measurable is *maya* (etymological root of *maya* is in measurement). Therefore, we are to look forward to the *source* of information. In nineteenth century, when the seer Sri Ramakrishna consciously touched Narendranath, who became known to the world as Swami Vivekananda, Narendra did not observe information every where! He saw 'life' everywhere. Everything, he felt, is full of 'life'!

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The source of information is 'life'. That is twenty second century's science. Life can't exist without consciousness. This consciousness has specific operations. That is twenty third century's science. We are working for three centuries ahead.

For the scientists working on consciousness, consciousnesscould be investigated as an operation, which isnecessary and sufficient for transition of signal to information, information to knowledge, knowledge to experience and experience to wisdom, also the vice versa.Consciousness could also be identified as the operation, which takes care of operations of self, life and mind for total quality management of information within the system with minimum turn-around-time.

The narrative unfurls a spiritual dimension. For many of scientists engaged in consciousness study, unconditional consciousness is the God in science. We all living systems are conditional consciousness for a specific situation, and in fact we are extension of this Oneunconditional consciousness. That is why, the science for consciousness unfurls gradually through evolution and transformation of the scientists engaged in it. Obedience of conditional consciousness to absolute unconditional consciousness is essential for personal evolution and transformation of the scientist.

The narrative of the paper is multidisciplinary. The paper is potentially loaded with promises for future in cell biology, synthetic biology, bioinformatics, brain-behavior dynamics, psychology, psychiatry, artificial intelligence and bio-robotics. There emerges the broad outline of unified systems science. In the science of healing implications are in psychosomatic medicine, mind-body medicine, personalized medicine, life-style medicine or even complementary and alternative medicine.

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Session: Science of Spiritual Biology

Chairpersons: Jiba Raj Pokharel, Ph.D., *Vice Chancellor, Nepal Academy of Science and Technology (NAST), Kathmandu, Nepal*

&

Bhakti Vijnana Muni, Ph.D., *President, Sri Chaitanya Saraswat Institute of Spiritual Culture and Science, Bengaluru, India*

Talk 1:

Quantum theory, Determinism and the Question of Free Will

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ABSTRACT:

Scientists and philosophers start questioning the existence of free will using the new discoveries in physical science as well as in neuroscience. The impression that we are able to freely choose between different possible courses of action is fundamental to our mental life but it is also suggested that this subjective experience is not more than an illusion. The concept of determinism in classical physics, indeterminism as revealed by Quantum Theory is critically analyzed here using the recent findings of neuroscience. We emphasize that randomness is not a proof of free will and determinism is for sure not a good argument against.

Keywords: Determinism, Quantum Indeterminism, Libet experiment, Self-determination, Free will.

Introduction:

The concept of free will occupies a central role in Indian and Western philosophy for many centuries. Scientists and philosophers are using new discoveries in physics and neuroscience to question the idea of free will. According to Stanford Encyclopedia of philosophy *"Free Will" is a philosophical term of art for a particular sort of capacity of rational agents to choose a course of action from among various alternatives.* The question of free has been widely discussed in modern science. The misunderstanding regarding the existence of free will stems from the belief that free means without having any prior cause but it is possible free means "exactly as we intended" or "not prevented by others". Infact, the cause effect relationship or the principle of causality and determinism in classical physics raises serious doubt on existence of free will in modern physics. However, the discovery of chaos theory leads this debate in a different direction. In non-linear dynamical system one gets the chaotic behavior remaining within deterministic framework depending on the initial boundary values. However, the chaotic behavior is connected with the issue of predictability not exactly with free will. The discovery of Heisenberg uncertainty principle in Quantum theory does little to clarify the misunderstanding. Recently, Michio Kaku's reasoning towards the existence of free will based on uncertainty principle is not convincing. The essence of his argument is that uncertainty principle prevents behavior from being 100% predictable. However, dice in classical probability theory are not 100% predictable either. Nervous ticks and epileptic seizures are likewise not predictable, but they don't feel like free will.

It is to be noted that one can look at the neurological and psychological processes underlying the perception of "agency" and the determination of action to understand free will. In the field of Neuroscience proposal are introduced to understand why some actions feel voluntary and others do not. Blakemore et al(2002) propose that the brain thinks it has free will because it can predict the body's actions but not its own thoughts. The intriguing issue is whether there exists any mechanism by which the choice can be initiated in the brain. Can we design any experiment by which one can definitely prove whether or not free will exists?

The motto of the present work is twofold: firstly how far we can understand the issue of existence of free will form scientific perspective i.e. whether the determinism or randomness or the indeterminacy in quantum theory can accommodate the existence of free will or freedom of choices from the perspective of physical science or needs to understand from neuroscience perspective and secondly to investigate whether we get some insights from ancient Indian philosophy.

We start discussing the concept of determinism and randomness in section II. In section III quantum indeterminacy will be discussed

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and discovery of modern neuroscience in section IV. Finally the principle of causality specially the self-causation or self determination and free will are critically analyzed in section V.

II. Determinism and Randomness:

The idea of determinism or causal determinism is an ancient one. It became subject to clarification and mathematical analysis in eighteenth century. On the one hand determinism is deeply connected to the development of physical sciences and with our views about human free action on the other. According to Stanford Encyclopedia of Philosophy determinism is defined as :

"The world *is* governed by *(or is* under the sway of*) determinism if and only if, given a specified* way things are at a time t, *the way things go* thereafter *is* fixed *as a matter of* natural law".

In western philosophy the roots of determinism lie in Leibnitz principle of sufficient reason. However, as soon as the scientists like Newton started formulating physical theory, the very notion of determinism becomes separated from its roots. Two other notions like *predictability* and *fate* are discussed and sometimes confused in the context of determinism. Deterministic views are often contrasted with random processes. In mathematics, deterministic and stochastic descriptions are sometimes considered as two sides of the same coin. For example, it is possible to describe Brownian motion using stochastic process and its deterministic description in terms of the macroscopic diffusion equation(a partial differential equation). So the immediate question arises whether the indeterminacy arising out of randomness gives rise to free will. William James wrote

"This notion of alternative possibility, [determinists] say, this admission that any one of several things may come to pass, is, after all, only a roundabout name for chance; and chance is something the notion of which no sane mind can for an instant tolerate in the world." —William James, The Dilemma of Determinism (1896)

Following James, for free will, it is necessary to believe in an indeterministic universe where future is not preordained but also open to several possibilities. The discovery of indeterminacy in quantum theory at microscopic scale gives rise to possibility of existence of random processes in the brain to make freedom possible. A large section of individuals feel that free will is not compatible with a fully deterministic universe. This indicates that belief in free will depends to some extent on the appearance of indeterminacy. Jeffrey P. Ebert and Daniel M. Wegner from Harvard University did an extensive behavioral study on indeterminacy and free will and their findings suggest that randomness in behavior—one's own or another's—can be mistaken for free will. Infact, the essence of randomness is the lack of any intention whereas free will presupposes the ability to act on conscious intention.

It is worth mentioning that the discovery of chaos theory within deterministic paradigm gives rise to the new insight in the debate reading the issue of free will and determinism. According to Newton's laws anything that happens in future time is completely determined by what happens now. Newton introduced a fully deterministic approach in science. Newton's theory was so successful that determinism prevails for several centuries for physical processes. In 1963 the meteorologist Edward Lorentz made an important discovery during his studies of a mathematical software program to build a software model of the weather. Infact, Lorentz studied a primitive model of how an air current would rise while being heated by the sun. Lorentz thought that since the computer code is deterministic he would get exactly the same result by putting same initial values. However, to his surprise he used to get drastically different result each time with the same initial values. After closer examination Lorentz realized that he used to get different results using initial values which are slightly different from each other. In the beginning he did not notice that initial values differ slightly from each other. Gradually it came to be clear that even the smallest imaginable discrepancy between two sets of initial conditions would always result in a huge discrepancy at later or earlier times, the hallmark of a chaotic system. The discovery of chaos seems to place a limit on our ability to apply deterministic physical laws to predict motions with any degree of accuracy. This indicates that randomness may lie in the core of deterministic universe. Subsequently, the scientists started to question whether or not it is meaningful at all to say that the universe is deterministic in its behavior. Strictly speaking, the discovery of chaos raises the issue of predictability rather than the existence of free will. The future is not exactly predictable does not necessarily means that free will exists. I will discuss this issue in details in the context of neuroscience.

III. Quantum Indeterminacy:

Famous physicist Richard Feynman stated

"If we have an atom that is in an excited state and so is going to emit a photon, we cannot say when it will emit the photon. It has a certain amplitude to emit the photon at any time, and we can predict only a probability for emission; we cannot predict the future exactly. This has given rise to all kinds of nonsense and questions on the meanings of freedom of will, and of the idea that the world is uncertain" (Feynman et al. 1965)."

Usually the discussion about freedom of will starts by considering the possibility of an ontological indeterminism. In Newtonian paradigm, a deterministic world is envisaged. We can talk about unpredictability but not about a fundamental indeterminism in nature's laws. As we mentioned earlier, unpredictability occur within the framework of chaos theory which does not violate the deterministic world view. According to quantum theory the evolution of wave function follows deterministic Schrodinger equation where as indeterminism occurs in observables once they are measured. Indeterminism is not present in the interval between two measurements but present only when the measurement is carried out. Other interpretations like by David Bohm do not need indeterminism in its formulation.

Essentially there exist two options for the description of world: determinism and indeterminism.

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If the molecules and atoms of the body follow deterministic physical laws then we are locked in a mechanism that does not leave space for freedom of will. Let us assume quantum mechanics gives rise to a framework which defends ontological indeterminism, will there be freedom of will? Indeterminism is a necessary condition for freedom of will but not sufficient one.

Kant said freedom is neither nature nor chance. Philosophers or scientists who think that indeterminism gives freedom of will forget the rules of classical logic and claim that "(p —> ¬q) implies (¬p —> q)", where "p" stands for determinism and "q" stands for freedom of will. This argument is false.

Martín López–Corredoira critically analysed this situation. He argued that let us build a robot which follows random laws. He asked the question is the robot free ? Of course not. Fetzer pointed out that indeterminism is not an absence of causation but the presence of non-deterministic causal process. López–Corredoira further analyzed and emphasized

"I mean that "causality" is not necessarily determinism; we can understand "causality" in a more general sense: causality as "explanation" or "reason". An explanation of or the reason for an event means following a law (perhaps a statistical law), and the presence of laws is the absence of free will. Quantum mechanics is indeterministic but it is not acausal. There is always a cause, an explanation or reason, for any phenomenon; for example, when an electron which is pushed towards another electron. Both electrons are repelled, and their positions and velocities are undetermined. The cause of repulsion is that we joint both electrons. The electrons are not free to choose their repulsion."

It clearly demonstrates that when an act is explained in terms of physical law – deterministic or probabilistic then we deny free will. John von Neumann and E. P. Wigner emphasized the role of consciousness in understanding the measurement process in quantum theory. However, their arguments are somewhat dubious. It is true that human beings are present in the final state of the measurement when the results are checked. But this does not imply that human beings produce collapse. Collapse can happen without considering the intervention of consciousness. Infact, the wave function of the microscopic entities collapses due to the interaction of macroscopic object say the apparatus. According to interpretation of Bohr and most of the leading specialists in Quantum Theory , the central element in the debate is not the consciousness but the distinction between the measured system and the measuring apparatus. A computer could produce the measurement and the observer could read the results once they were already obtained and saved in the memory of the computer. Ofcourse, no one will be able tell whether the collapse was produced by the computer and the measuring Apparatus before the observer checked the results or by the human mind when the observer checked the results (Schrödinger´s cat paradox), but one can interpret quantum mechanics without the notion of an autonomous mind in the role of an observer. Physicists have nothing to say about the mind but neurologist do. Nowadays, most neurologists adopt a materialistic philosophy in which the mind can be explained in terms of neurological processes (Crick 1994). Let us try to understand the developments of neuroscience and the question of free will.

IV. Free Will and Neuroscience:

Scientists and philosophers are using the new discovery of neuroscience to question the existence of free will. The recent findings of neuroscience like the data published suggest that our brain makes decisions upto seven seconds before we became aware of them. Considering the philosophical principle that any action must dependent on preceding causes, the above data imply our behavior is never self-generated and freedom of will is an illusion. Several group of neuroscientists performed some experiments which shed new light on the question of free will.

The EEG recordings of Libet experiments showed that readiness potentials can be recorded approximately 350 ms before the participant was aware of having made decision. This implies our actions are determined by natural laws. More recent fMRI Experiments (Haynes Group) found unconscious determinants of free decisions in the human brain. Decision related BOLD signals in fMRI recordings up to 10 before the subjects are becoming aware bout their decision. Similar data, from autonomic reactions (e.g. skin conductance) are found by Damasio group.

Unconscious determinants of free decisions in the human brain as found by Soon et al and appearance of decision related BOLD signals in fMRI recordings up to 7 before the subjects becoming aware bout their decision go against the existence of free will. It is generally believed that we are able to freely choose between different possible courses of action is fundamental to our mental life. But it also has been suggested from the experimental data of neuroscience that this subjective experience of freedom is not more than an illusion because our actions are initiated by unconscious mental processes long before we become aware of our intention to act. Recent recordings of brain activity (EEG or fMRI, Libet, Haynes, etc.) may demonstrate unconscionous processes in decision making but they do not really prove **DETERMINISM.** Infact, **unconsciousness** is not the problem (everyday experience) the problem is **DETERMINISM** !

If one accepts:

1. that decisions are made by mechanistic functions, e.g. in the brain
2. that these functions are obeying **deterministic** physical laws one hardly can deny what brain researchers, like **Wolf Singer** claim: "We should stop talking about freedom. Our will is not free. Our actions are determined by physical laws" or others, like **Gerhard Roth**, conclude: "We do not what we want - but we want what we do".

What can neuroscience really contribute to this discussion?
According to **Gerhard Roth:** *There are no indications of indeterminisms in the brain*

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While Frank Moss emphasized that: *Biological systems are notoriously noisy.*

As per the current findings of neuroscience, **randomness, of course is NOT a proof of a free will, however, determinism is for sure NOT a good argument against.**

V. Self-Determinism and Free Will:

To understand self-determination we need to consider the various type of causal theories. There are four pre-Buddhist causal theories. They can be classified as follows :

1. Self-causation (sayam katam) : the basic assumption of this metaphysical postulate was that the cause and effect are identical.
2. External causation (param katam) : which includes several theories as
   - Time
   - Creation by God
   - Inherent nature(svabhava)
   - Action or behavior(karma)
   - Fate (niyati)
3. Internal as well as external causation: combination of first two theories.
4. Neither external nor internal causation; which denies any form of causation.

According to modern cosmology, the universe is manifested out of the fluctuations of quantum vacuum. Heisenberg uncertainty principle is supposed to valid everywhere. According to this principle, enormous fluctuation of energy occur during very short duration of time. This fluctuation of energy gives rise to the manifestation of the universe. There exist seeds or potentialities in the vacuum which give rise to the physical attributes of the physical universe. Nothing exists beyond quantum vacuum and hence it is self-referential and self organizing. Here, we have a situation where one can think of self-causation or self-determination but not the freedom of will. It is worth mentioning that Bohm and Hiley mentioned a kind of paradoxical situation called paradox of the universe before the existence of any mind.

Lopez-Corridoira tried to explain the situation as

"If the mind produced the collapse of wave functions in matter, then nature before the existence of minds was uncollapsed, and there was no birth of the Universe because it is still in a superposition of states. Absurd! Further ridiculous ideas were proposed to explain this paradox (e.g., Kafatos & Nadeau 1990) by arguing that some Universal Mind (God?) was present before the existence of life on the earth to collapse the wave functions, but this pantheist solution does not explain why human mind is now responsible of the collapse instead of God's Mind. Did He take a holiday after our appearance? Absurd!"

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Talk 2:

The Karmic role for the dynamism in Nature or So - called Evolution II*

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(* Part I was published in the souvenir of Science and Scientist 2016)

Abstract
By now several theories on biological evolution are forwarded by scientists; however none of the theories have given a complete answer. Hence there were conflicting arguments among themselves. One of the serious flaws seems to be that they are failing to incorporate the consciousness variable in their explanation. Among moderate evolutionists too, some defend to adaptation, some defend to altruism, some defend to convergent evolution, yet they are shy enough to stand in favor of incorporation of role of consciousness in full fledged manner. Continued physical and mental (psychic) vibration thus impacted in the form of habit that pushed by say collective unconscious, food chain relation, intra and inter species specificity, neuroplasticity, long term or reciprocal altruism, epigenetic mechanism and convergent evolution etc. are the products of conscious wishes that perhaps dictates for dynamism of Nature. Hence physical and mental Karmic force which give uninterrupted flow of reciprocal wishes in each entities of the universe including that of the astral beings(if there is any), must be the real cause for the dynamism of Nature. As physicists are explaining retro causality in cause and effect cycle and as some physicists are pronouncing the greatest effect of Karma as in BIS theory, Karmic role in biological dynamism cannot be undermined.

Introduction

Jean-Baptiste Lamarck proposed in 1809 that the characters that were used most often would accumulate a "nervous fluid"[1] and such acquired accumulations would then be transmitted to the individual's offspring. On other hand Charles Darwin and Alfred Russel Wallace both jointly proposed a theory of evolution majorly attributing to natural selection, struggle for existence, speciation and adaptation in 1859.[2] But Alfred Russell Wallace, the coworker of Darwin, later did not find logical answer from his own theory hence he himself departed from the Darwin's theory and advocated the intelligence basis of evolution.[3] Weismann (1834- 1914) by cutting off the tails of mice over several successive generations and getting without having any effect on tail length started to advocate on the role of gene and genetic composition in biological evolution.[4] Using gene frequency, population geneticists argued that the fitness value of the gene to survive is the real basis of evolution.[5] In recent days molecular biology (DNA, and gene sequencing etc.) which deals with micro and nano level biological entities finds a number of phylogenetic connections among species, are putting forward different kinds of pictures of evolution than what were before.[6] Hence no theories postulated by the scientists so far have been successful to project a concrete truth what of really under goes in the process. It might be due to one sided materialistic basis of explanation, and ignoring the role of consciousness such as Karmic principle played by wishes of

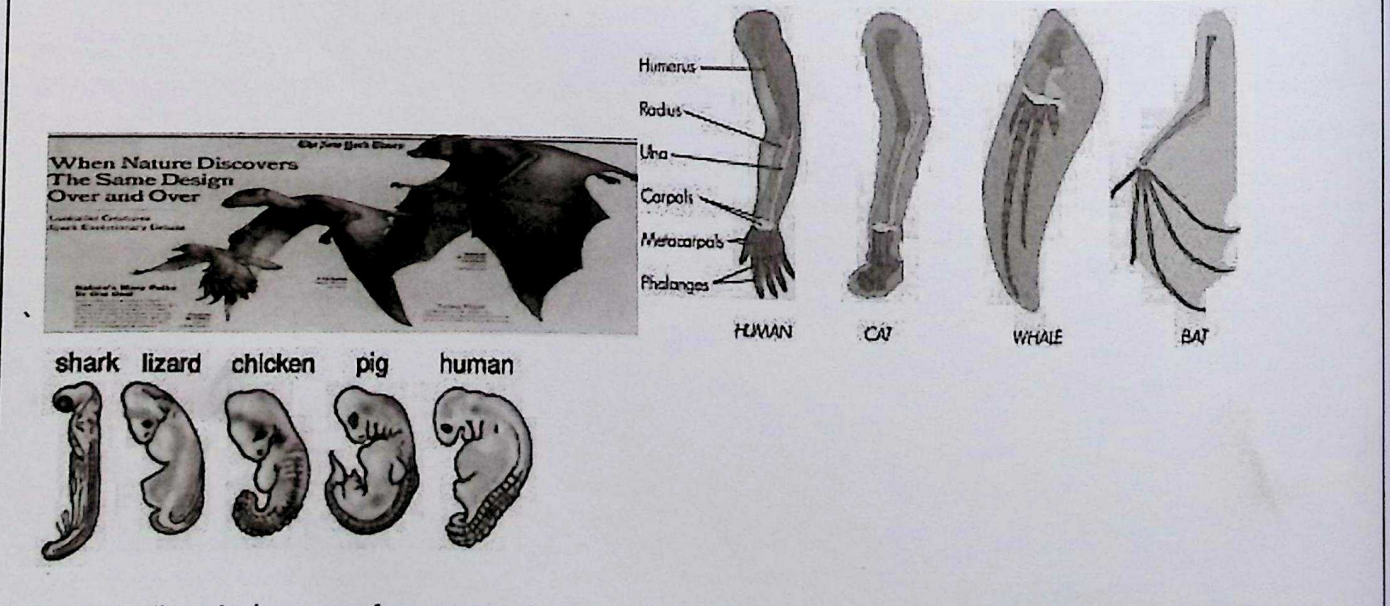

Figure 1: As all species have come from same stock, the variations among them are arose because of wishes to be entities of different potentiality, hence there is gradual differences in anatomy (a), embryology (b) and morphology (c).

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the visible biological entities and or possibly by the role of invisible higher conscious (astral) beings. Emphasizing Karmic role for regulation of dynamism in Nature or so called evolution, a paper was presented in the *Science and Scientist 2016* seminar, Bangalore and this paper is the continuation of the same series.

It is said that continued adaptation of same practice say in walking, eating, talking, working, speaking, thinking, behaving or any action for 21 to 120 days, a habit is formed in ones' life.[7] The same habit, sending impulses to internal tissue or cells and physiology trains the internal systems. The habit thus formed gives a tendency in desire i.e. "Vasana" – from where mind is pre-programmed to be adapted to the practices – whether good, bad or neutral. Karmic vibration, a distinct oscillation of conscious force attached with wishes, continues to work in mind and body.

Boris Iskakov (1960), professor of Institute of Physical Engineering in Moscow, linking the rational activity of Karma says that the superposition of inputs (causes) and outputs (effects) and their interactions over a diverse fabric of time-space constitute a feedback mechanism in which the response of the individual creates new causes which in turn produce a new effect.[8] Iskakov also introduces a term "Karmic equations" in which he mentions balancing or conserving of energy reaching the original position that was there before the disturbances of the energy level. That means once force is initiated, say the rising of a sea wave, then the rising state of wave does not continue to be rising, it must be subsided in order to attain normal state. In other words, the potential and kinetic energy must be equal to arrive in the original state. Iskakov gives an example of two opposite poles: a perpetrator pole and the victim pole. Evil can't exist without the opposite of receivers. That means victim also attracts the perpetrator, perhaps due to past life Karmic relations. The perpetrator pole and the victim pole are inter-dependent and they are entangled in simultaneous phenomena.

Impact of Psychic Vibration in gene expression and physiological functions

Every fraction of second, the cells of each biological entity divide while travelling from stem cells to adult cells during the process of differentiation. Psychic and physical impacts, good, bad or strong or neutral that radiated during the period of the travel will create impact accordingly w.r.t. the differentiating cells. Tooby and Cosmides (1990) say that each emotion entrains various adaptive programs - deactivating some, activating others, and adjusting the modifiable parameters of still others - so that the whole system operates harmoniously and efficaciously. [9] The following are the Karmic situation in which a change in life style (mode of Karma) have been found changing the gene expression even within the same individual through forces such as electromagnetic force (EMF).[10]

1.Yoga, meditation, tai chi and relaxation practices has brought forth numerous new studies modulating gene expression.[11]

2.Endogenous EMFs generated by the intracellular network of micro-tubules, centrosomes and chromosomes play a fundamental role in regulating the dynamics of mitosis and meiosis,[12]

3.EMF altered gene expression in human mesenchymal stem cells and chondrocytes[13]

The karmic (physical and mental) vibrational push and pull moulds our biological makeup; iridology and even palmistry. Many clinical psychotherapists explain that a deep resentment from an unpleasant karmic 'payback', which acts like 'a cancer on the mind,' may eventually produce an actual cancer in the body as a psychosomatic disease.[14] Many have found that their unpleasant way of life have been altered in a positive way by correct thoughts, right behavior, prayer and meditation.

Collective unconsciousness may design the shape of dynamism of Nature

According to Carl Jung (1958), the human collective unconscious, deposited in deep realm of the mind as archetypes, motivates the individual to attract towards a final end.[15] That means life is fundamentally teleological, our progress runs towards a goal. If life is teleological, evolution could not have been driven by random materials' action and reactions. Rather there was continued sequence of purpose started long time ago, as if goal has been set by some reason (say by supreme consciousness). Similar to Carl Jung, another great psychologist Abraham Maslow (1908 -1970) to whom later William James, Ken Wilber joined designates to the same collective unconscious by the term transpersonal psychology which extends beyond the individual to encompass wider aspects of humankind, life, psyche or cosmos".[16] If we cross check this inherited transcendental consciousness with the dimensions mentioned in the string theory of physics, it complies to the eighth and ninth dimensions, as they represent histories of Universe originated in the same time and different times, respectively. Those conscious images in the form of history remain equivalent to the collective unconscious. The collective unconscious images of the past work as *Sanskar* transcendence collectively, but does not confine in an individual. Those information registered having a collective unconscious give direction to future in combination with future attractors and free will. Hence this interpretation would give adequate space for explaining the role of past life Karma to be played in the days to come. Of course, the notions like survival of the fittest, struggle for existence and speciation that were forwarded by Darwin can straight forwardly be rejected. But with regard to notion of adaptation which gives smell of consciousness hidden in it does not come without any teleological cause that teaches for survival and better life. 'Which factors pushes for adaptation' is the subject of conscience, and a given path of adaptation must have been judged by experience including that of the past lives as well as that of future attractors, but not by interpretation of random interactions of matter. Accidently we see inert matter following a certain track, but without involvement of teleological cause especially for maintaining the balance of the beautiful nature since the time of origin to to-date cannot be rationalized.

Several learned, enlightened or divinely graced personalities including recent scientists have repeatedly reported that there might have been cataclysm several times in the Universe, and consequently there might have been rise and fall of civilizations. In such context, as consciousness being superior than inert matter, the lost wisdom after

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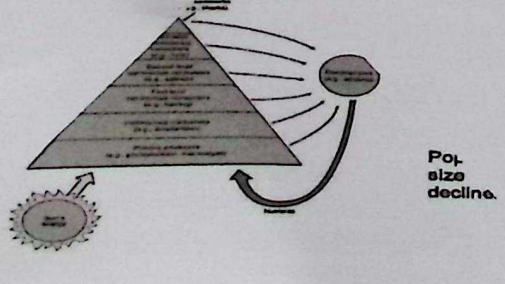
cataclysm must have been heard or learned by sages through extra sensory like perception (EPS) or through mediumship or through enlightment. In the past, creatures must have seen different beauties morphogenetically and might have developed appetite to be like that (beautiful or desirable) knowingly or unknowingly. For example, right now we human may be looking almost same but our appetite, outlook, wishes, thinking that we possess are so diverse, ranging from the worst creature to the ideal divine one. As per wishes (Karmic vibration) we get modifications in our body and mental structure even impacting the shape of future generations as the product of interaction of consciousness with genetics, epigenetic, environment. Following arguments endorse this hypothesis.

As said earlier, after 21 to 120 days repetition of the same practice creates regular vibrational impulse in body and psyche resulting into a habit. The habit thus formed imparts impact to the somatic as well as psychic system to be designed in a way that it fits well to the shape of those wishes. We can generalize, wishes with different ideologies and mentalities that give different impact to the shape and sizes, morphology, physiology and anatomy. For example consider that a body-builder, boxer, vegetarian, breatherian, sadhu, saint, yogi, druggist, alcoholic etc. will attain their respective anatomical and physiological state as well as psychic condition in a single life time. Although this example is simple but it shows how two diverse life styles bring differences between one another in a single generation that sudden crossing say body builder to sadhu and vice versa or saint to druggist may lead to even fatality. Even Sadhu who submits his hand by raising it above the dead for 10- 15 years or more appear differently than general men anatomy. Grafting gives different shapes as planned. Not only somatic cells but also gametic cells get influenced through epigenetic mechanisms, architecturing the shape and/or potentiality of the species in generations to come.[17] The infinite wish based vibrational forces that impart morphogenesis undergoing through the process (consciousness, genetics, epigenetic and environment interaction) must have caused for variation i.e. dynamism of Nature. The more the generations proceed the more effects due to these must have been percolating, resulting in infinistimal variation of a single species, physically and psychically. Gradual modification as we see in Figure 1 in different species may be because of impact of gradual thrust of psyche of species interested to be so. Say for example some four pedal hominids like to be bipedal, bat (mammalian) liked to fly as bird. The humerus, radius ulna, tarsus and metatarsus bones of arm or wing of human (terrestrial herbivorous), bat (Avian), whale (Aquatic) and cat (terrestrial carnivorous) modified their hand structures to be capable for fulfillment of respective wishes (mind set), despite being original foundation the same (Figure1).



The variation by a parent does not only limit till their youth stage or till mating of a couple stage only which passes epigenetically but also new generation or new society around them (parent having good or bad virtues), also continue to produce effects to new generation. The type of habit, the type of ideology, the type of nobility that parents demonstrate in front of offspring or society continue to be received till to their end of life, psychologically and socially. In other words, whatever good or bad, vibrations radiated by the ancestor or previous society will continue to effect the family members and society – which can be even powerful enough to change to large number of members of society psychically or socially, even more powerfully than that passed through epigenetically.

Had not wishes played any role, variations would not have resulted so much as we are seeing between and within species because the environmental or genotypical factors of a species remains almost the same for a given period of time, say for some decades or so. Or in other words, supposing they are more or less constant for some period of time, yet we see a continued variation. The possibility of continuous and infinite variation can be imagined only when the psychic forces (consciousness) in the form of wishes intervene in the said regime. So, psychic vibration (conscious wishes) arose for the purpose for finding better quality of life generated by adoptive willingness. This must be the potential cause for such occurrences. The following pictures illustrate the gradual modification in species keeping the fundamental structure the same in most of the species, at least in the same phyla.[18]

Experiment conducted in the field of Cymatics supports the fact that an intensely vibrating wave of sound produces different structures in the medium (say thin layer of sand) as per frequencies.[19] Masaru Emotu's finding that the design of ice crystal are changed as per wishes or mood of experimenter or circumstances in or and around shows the role of conscious vibrational impact.[20] If we can see direct effect of ordinary wave to matter, then continued psychic vibrational effect of wishes or emotions in the spectrum of physiology, anatomy, embryogenesis or morphology cannot be laid into baseless ground.

As early as twentieth century (1917) scientists like D'Arcy Thompson hinted at vitalism rather than Darwin's struggle for existence like concepts and offered geometric explanations in the process of diversification of species.[21] Another scientist Stuart Kauffman favored self-organization, the idea that complex structure emerges wholistically and spontaneously from the dynamic interaction of all parts of an organism.[22] Although Kauffman arrived close to self-organization sort of concept, but he did not elaborate who guides for the setting of organization and who is there behind the screen. G. B. Muller and S. A. Newman, inheriting the viewpoint of D'Arcy Thompson argued that physical factors such as surface tension can cause self-assembly.[23] Conscious vibration of wishes of organism could have been the force to exert the pressure on surface as tension and shaped the organism as per wishes rather than just phenomena of random action and reaction.

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Food Chain Relation and Intra and Inter Species Specificity shows Karmic Consequences

In nature food chain is life saving necessity through which Karmic law must have been working. One which eats other is eaten by someone else just to maintain the balance. Plants or plankton (producer) are eaten by herbivorous cattle, goat, grasshopper insects etc. and they are eaten by their respective primary carnivorous frog, cat, crow, and hyena. And these primary carnivours are eaten by secondary carnivours like snake and secondary carnivours are eaten by tertiary level carnivours like hawk and eagle.[24] Finally all of the entities are degraded, decomposed and dissolved into soil by microbes, bacteria, virus or fungus. In nature we see the higher the aggressors i.e. species of predators of the highest level, the population size as well as life span of those species decline (Figure 2). Besides, the most aggressive species must have spent a solitary and desperate life as compared to the non aggressive species; because the member of the same or other species avoid them because of fear. It implies that higher the aggressors, the burden of Karmic load increases. Hence the producer and herbivours which are not so much aggressive must have received facility to out number and enjoy sociability within and between the species as their Karma is cooperative equivalent to Punnya (pious) Karma. Most aggressors suffer with loneliness and isolation, and often sudden death due to attack by bacteria, virus or fungus. Therefore, it can safely be argued that conscious Nature must be working in a balanced way by incorporating the principle of Karma.

Table 1. In general, more aggressive species have short life span and less population then the less aggressive (Also see Fig 2)

Animal	Diet	Maximum Life Span
Camel	Herbivore	50 years
Horse	Herbivore	40 years
Elephant	Herbivore	70 years
Galapagos Tortoise	Herbivore	200 years
Human	Herbivore	100 years
Tiger	Carnivore	22 years
Lion	Carnivore	35 years
Dog	Carnivore	15 years

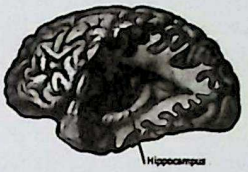
Figure 2 . Food chain of different species of plants and animals. This picture shows the decline of population size with higher level carnivorous regime

positive, negative or mutually beneficial interaction with another generation after generation as an instinctive character, such as between crow and Cuckoo (Koil), pigeon and Myna, human and dog, anemone and fish, shrimp and goby fish, aphid and ant, yarcha gumba and fungus and so forth, but not to other species, shows one of the potential basis to argue that the Karmic relation must have played the role (Kharel, 2016).

Mindfulness (Psychic Karma) change neurons through Neuroplasticity

Neuroplasticity refers to the ability of brain to re-organize itself, both physically and functionally, throughout life due to environmental, behavioral, thinking and emotional effects.[25] The literature elaborates further that behavior, environment , thought, and emotions may also cause neuroplastic change through activity-dependent plasticity, which has significant implications for healthy development, learning, memory, and recovery.

When a study was conducted to detect differences in brain structure between meditators and non-meditators using Magnetic Resonance Imaging (MRI), it revealed that meditators had a thicker cortex than non-meditators. **(Lazar et al. 1997).26 Similarly Vestergaard-Poulsen et al 200927 and Hölzel et al. 201128 both arrived in the same conclusion that meditation or mindfulness increases brain's gray matter density as compared to the control group. Finding similar result by Luders et al 2009 it was reported that there was larger hippocampal and frontal volumes in long term mediators than the control group.29**



Likewise **Tang, et al (2012)** found a very exciting study showing the impact of meditation practice on the connections between brain areas.[30] After only four weeks of meditation, there were changes in white matter – which is strongly involved in interconnecting brain areas including cingulate cortex that contributes to self-regulation, an important aspect when people start engaging with meditation practice. These scientific findings now can be correlated with the fact that the thoughts or wishes (conscious acts) are changing the shape, organization and potency of organism including brain as well as physiological functioning. If some practices or habits such as meditation (radiating vibration in a specific direction) can change the structure and functioning of the brain, then we can comfortably argue that all anatomical, physiological, embryological and morphological including genetic changes must have been occurred by the long term (eons of years') wishes, practices, habits etc in the substrate of gene, environment and their interactions.

Long term and Reciprocal Altruism supports the Karmic Principle

Some scientists attributes no or less fitness value to altruism, as altruists sacrifice their life for the sake of others, consequently other become viable and but it itself loses its own advantages. Another bunch of scientists cannot get satisfaction from those kind of derivation and forward the concept that 'long term and reciprocal altruism' do play role for evolution. (Stanford Encyclopedia of Philosophy, 2013)[31]

Although altruist apparently seems to be of less advantage but in the long-term, where the beneficiary of the behaviour pays back the favor at some point in the future (Sachs *et al.* 2004).[32] Similarly, in symbioses between members of different species, it may pay an organism to sacrifice resources for the benefit of a symbiont with which it has a long-term relationship, as its long-term welfare may be heavily dependent on the symbiont's welfare. Trivers (1971) forwarded another term 'reciprocal altruism'.[33] Trivers' basic idea was: an organism may get help from another, if there is an expectation of the favor being returned in the future. For reciprocal altruism to work there is no need for the two individuals to be related, nor even as members of the same species.

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Axelrod and Hamilton (1981) argued Tit-for-Tat strategy which widely confirm the idea that with multiple encounters, there could be favor at the level of social behaviours that entail a short-term fitness cost.[34] All of the above altruistic behavior somehow or other support the Karmic principle express in a proverb "As you sow so shall you reap" .

Furthermore, cooperation in a way of inter-connectiveness can be elaborated specially considering the case of ecosystems. There are infinite number of eco systems which can be generally summoned up as terrestrial, aquatic, desert, pound, Arctic, Antarctic etc. under each of which contains numerous systems in the earth. The kind and relation of flora, fauna and phytoplankton in each system, say pond ecosystem, varies with another, even the nearby pond ecosystem varies with neighboring one. In the context of physical conditions such as pH, aqueous condition, temperature, humidity, O_2, CO_2, NH_4, NO_3 etc. the interaction of phytoplankton, animals, microorganism, decomposer etc available in each of ecosystem uniquely differs as per the situation prevailing there. In this context we can comfortably imagine how such numerous systems are independently working on the upper crust of the earth in an amazingly intelligent manner, even without learning from next one! Interacting mechanism is spontaneously spurred for regulating the system in the lively manner with full sense of intelligence. Who architected it, had there not been intelligent process involved with teleological mechanism? Although recent days many sober scientists are referring to long term or reciprocal altruism for linking with the fitness value for survival, but explanation without incorporating to conscious Karmic force arose, the possibility of occurrence of spontaneous intelligence in each system or niches perhaps can not be imaged.

Convergent or Divergent Evolution[35] may be because of effect of Wishes (Karma) but not genes and environment alone.

Convergent evolution is the process by which unrelated or distantly related organisms evolve similar body forms, coloration, organs, and adaptations. Hundreds of mammals, hundreds of birds, hundreds of fish and plants show clear features of resemblance despite no ancestral or genetic linkage.[36] See some example in following Table 2.

Table 2. Resembling species at least in some traits because of common environmental condition despite being diverse genetic make up.

Terrestrial	Aquatic	Aerial
Giant Armadillo (N. America)	Ichthyosaur	Bird
Giant Pangolin (Africa)	Shark	Bat
Spring Anteater (Oceania)	Dolphin	Pterodactyl
Giant Anteater (S. America)	Penguin	Flying fish

Why is there resemblance in the different species despite possessing diverse genetic make up? It must be due to the wishes as they need to combat with the similar environmental circumstances they are confronting. These cases antagonized the divergent evolution biologists who consistently press that the gene and genotypes are only the factor for variation through mutation and drift. On the other hand we can ask to the convergent evolutionists as well that if there is continued effect of environmental urges dictated by the external factors to few hundreds of species to become resembled each other, why had not the same effect appeared in all the species in the similar way?

If someone says that it is because of genotypeXenvironment interaction effect, it usually used to be a minimum consideration. Hence every time we are confronted with an incomplete answer which must be because we missed to incorporate consciousness as the primary variable. So it is not gene and environment nor is it because of interaction effects alone but above all the Karma guided by superconsciousness must be designing the direction of the Nature where and how it has to evolve.

Conclusion

Since every patchy finding of evolutionists are contradictory among themselves, the Karmic theory comes to be as one solution because the wishes of homonides say from four legged to to be bi-pedal, from hairy to smooth skin, dull to more sharp intellectuality etc. must be the natural wishes of theirs. Despite several attempts to explain the pattern of evolution or dynamism of Nature say by Lamarck, Darwin, Wiseman, Fisher and Wright, molecular geneticists etc., the theory on the dynamic pattern of Nature remained incomplete – which must be, if this hypothesis arrive to give some sense, we argue it must be because of failing to incorporate consciousness variable in all of those jumble. The conscious variable which has come as Karma (physical, mental, visible or invisible) must be a extraordinarily powerful force as some of the physicists are arguing on the basis of acoustic anisotropy resulted from the slaughter house during killing of animals results into earthquake (BIS Theory).[37] If this kind of Karmic forces are possible for the earthquake, the forces of dark matter and dark energy too may have been controlled by Karmic forces.[38] Then why is not the Karmic forces regulating for dynamism of nature? Recent days a swarm of scientists[39] including Adrian Klein[40] are defending retrocasuality principle which are not only throwing light on Karma but also in the essentiality of consciousness in the process of completion of cause and effect cycle.[38] Thus the visible and invisible conscious vibrational wave demonstrated in the form of Karma form each of the entities of universe (in addition to the forces generated from astral beings which is noticed through ESP, medium, shaman or any other metaphysical phenomena) must be playing role for the dynamism of Nature – for the purpose of positive – negative or evolutionary - devolutionary dynamism of Nature.

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Talk 3:

Bacterial Intelligence and Sentience

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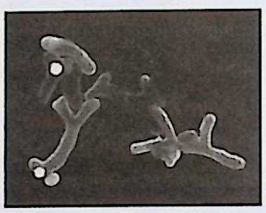
Although the theory of Abiogenesis claimed that life first came from matter there is no demonstration of it. They had neglected the sentient concept of life in the 19th and 20th century. But the timeless Vedantic understanding is that the law of life is Biogenesis and everything came from within consciousness. In the first two billion years of life on Earth, bacteria – the only inhabitants – continuously transformed the planet's surface. Bacteria survived the worldwide crisis long before the dawn of larger forms of life, because of special abilities that other life forms lack and that add whole new dimensions to the dynamics of evolution. Fully 10 percent of our own dry weight consists of bacteria, some of which – like those in our intestines that produce vitamin B12 – we cannot live without. All life on Earth today derived from common ancestors. The first to evolve – yet the last to be studied in detail – are bacteria. Scientists have now discovered that bacteria not only are the building blocks of life, but also occupy and are indispensable to every other living being on Earth. Without them, life's essential processes would quickly grind to a halt, and Earth would be as barren as Venus and Mars. Most of the cells in our body are not even technically "human", in fact, foreign cells outnumber ours by 10 to 1 (American Society for Microbiology), however, without these other organisms we would die. Within days of being born we had the instincts necessary to colonize our bodies with the appropriate bacteria and germs. We thank the different creatures that abide in our body. Because without all of the we simply wouldn't be "me". Strictly by the numbers, the vast majority — estimated by many scientists at 90 percent — of the cells in what we think of as our body are actually bacteria, not human cells. They carry out vital functions such as helping us digest food and even... fighting viruses. Unfortunately, we tend to kill them by the millions when we use antibiotics. An antibiotic does not discriminate between friend and foe: it kills all bacteria in our body.

Bacteria and Humans

As compared to other living entities bacteria can easily survive the crisis, because of their special abilities to adapt to the environmental changes. The simplest living entities, yet the last to be studied in detail – are bacteria. Bacteria also occupy and are indispensable to every other living being on Earth. Without them, life's essential processes would quickly grind to a halt, and Earth would be as barren as Venus and Mars. Most of the cells in our body are not even technically "human", in fact, foreign cells outnumber ours by 10 to 1. Strictly by the numbers, the vast majority — estimated by many scientists at 90 percent of the cells in what we think of as our body are actually bacteria, not human cells.[1] Without these other organisms we would die. Within days of being born we had the instincts necessary to colonize our bodies with the appropriate bacteria and germs. We thank the different creatures that abide in our body. Because without all of them we simply wouldn't be "what we are". They carry out vital functions such as helping us digest food and even fighting viruses. Unfortunately, we tend to kill them by the millions when we use antibiotics. An antibiotic does not discriminate between friend and foe: it kills all bacteria in our body.

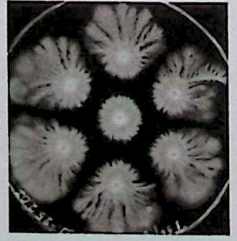


Endosymbiotic theory

In contrast to conventional evolution theory (survival of fittest), symbiogenesis establishes that life did not take over the globe by competition, but by cooperation. Lynn Margulis believed that long-stable symbiotic associations between two or more organisms can result in noble transformations that are favorable for all of them. Margulis explained genomic mergers as the most important cause of genetic variability. Many examples of symbiogenesis are explained by Margulis and Sagan[2] in the book *Acquiring Genomes: A Theory of the Origins of Species*.

Bacteria also have a remarkable capacity to combine their bodies with other organisms, forming alliances that may become permanent. A species of 'glow in the dark' squid is also an example of symbiosis and it has an organ which accommodates light-emitting bacteria. Cows have microbial symbionts in their rumen which help them to digest grass. Fully 10 percent of our own dry weight

Lynn Margulis consists of bacteria, some of which – like those in our intestines that produce vitamin B12 – we cannot live without.[1] Either engulfed as prey or invading as predators or as endosymbionts these bacteria took up residence inside foreign cells, forming an uneasy alliance that provided waste disposal and oxygen-derived energy in return for food and shelter. Even though symbiotic cooperation may help organisms to succeed in the struggle for existence, Natural Selection has nothing to do with such origins.



Bacterial Sentience

We are made up of a community of organisms, this is a fact. Beyond this fact, we believe that we are a community of organisms who have come together in a common consciousness that is more brilliantly complex than we could ever hope to understand. If all creatures are conscious in some way or other, then consciousness is not something that evolved with human beings. Different degree of consciousness has always existed with each

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species. It seems probable that any organism that is sensitive in some way to its environment has a degree of interior experience. Are microbes far more sentient than we give them credit for ? Many single-celled organisms are sensitive to physical vibration, light intensity, or heat.

Who are we to say they do not have a corresponding degree of consciousness? We should not impose our ideas on nature and should allow nature to reveal her to us. Bacteria can distinguish "self" from "other," and between their relatives and strangers.[3] For the most primitive beings in the web of life, some researchers claim, "simple" might not mean "stupid".[4] Bacteria, long perceived as simple creatures, are now recognized to be smart beasts that can conduct intricate social life while using sophisticated chemical language, one we have only recently begun to decode. The bacterial power of cooperation is manifested by their ability to develop large colonies of astonishing complexity. *Paenibacillus vortex* is a species of pattern-forming bacteria, first discovered in the early 90's by Ben-Jacob's group. It is a social microorganism that forms colonies with complex and dynamic architectures. *P. vortex* colonies behave much like a multi-cellular organism, with cell differentiation and task distribution. Accomplishing such intricate cooperative ventures requires sophisticated cell-cell communication. They can communicate, prey in packs, and have social intelligence.[5]

Bacterial Teamwork and cross talk

Bacteria use chemicals to talk to each other and to nonbacterial cells as well. These exchanges work much as human language does and "linguistic communication" enabling bacteria to engage in intentional behavior both singly and in groups.[6] In other words, they have "social intelligence" and some of them hard to understand unless you are another bacterium or a devoted bacteriologist. One of the most straight forward cases is demonstrated by *Bacillus subtilis*. If *B. subtilis* individuals are growing in a food-poor area, they release chemicals into their surroundings. These essentially tell their neighbors: "There's not much food here, so clear off or we'll both starve." In response to these chemical messages, the other bacteria set themselves up further away, completely changing the shape of the colony. Cooperation is the key to the bacteria's survival. And, cooperation requires a highly advanced level of communication. In 2004, Ben-Jacob proposed bacterial communication contained semantic and pragmatic aspects. According to Ben-Jacob cancer cells also are intelligent, similar to bacteria colonies. His theory is that if cancer cells are a society of smart and communicating cells, then by disrupting their channels of communication, humans can make it hard for cancers to spread and evolve resistance. Cancer seems to destroy the communication of the immune system or causes it to send false messages. Thus, immuno-therapy is a big thing in cancer research.

Many single-celled organisms can work out how many other bacteria of their own species, are in their vicinity – an ability known as "quorum sensing". Each individual bacterium releases a small amount of a chemical into the surrounding area – a chemical that it can detect through receptors on its outer wall. If there are lots of other bacteria around, all releasing the same chemical, levels can reach a critical point and trigger a change in behavior. Pathogenic bacteria often use quorum sensing to decide when to launch an attack on their host. Once they have amassed in sufficient numbers to overwhelm the immune system, they collectively launch an assault on the body. Jamming their signals might provide us with a way to fight back.

Not only can bacteria be talkative and co-operative, but they also form communities. When they do, the result is a biofilm, most familiar as the thin layers of slime that coat the insides of water pipes, or kitchen surfaces. Biofilm extracellular polymeric substance, which is also referred to as slime, is a polymeric conglomeration generally composed of extracellular DNA, proteins, and polysaccharides. Biofilms may form on living or non-living surfaces and can be prevalent in natural, industrial and hospital settings. They're also found in biological refuges, like the inner linings of human digestive systems – anywhere, in fact, where there is plenty of water.

Bacterial Intelligence

Many different species of bacteria live side by side in "bacterial cities", munching one another's wastes, cooperating to exploit food sources, and safeguarding one another from external threats – such as antibiotics. Similarly, some bacteria move according to the presence of chemicals in their environment – a behavior called chemotaxis. Bacteria use chemotaxis to find nutrients, avoid toxic chemicals, sense pH, and interact with host organisms in symbiosis and pathogenesis. *E. coli*, for example, move if a few molecules of food are dropped into their environment. Another group of bacteria align themselves to the Earth's magnetic field, allowing them to head directly north or south. Known as magnetotactic bacteria, their special ability comes from specialized organelles loaded with magnetic crystals, magnetosome.

But perhaps the most striking feat of microbial navigation is performed by the slime mould *Physarum polycephalum*. This organism has been shown to exhibit intelligent characteristics similar to those seen in single-celled creatures. For example, a team of Japanese and Hungarian researchers have shown *P. polycephalum* can solve the Shortest path problem.[7] This colony of amoeba-like organisms always finds the shortest route through a maze.

Talk Between Human Gut and Brain Through Microbiota

The bacteria in our guts can influence the working of the mind, says Frank Swain.[8] Many of these microbes actively help digest food and prevent infection. And now evidence is emerging that these tiny organisms may also have a profound impact on the brain too. They are a living augmentation of our body – and like any enhancement, this means they could, in principle, be upgraded. We can hack our microbiome to make ourself healthier, happier, and smarter too. The bacterial microbiota in the gut helps normal brain development, says John Cryan, (Professor of Anatomy and Neuroscience at University College Cork): "If we don't have microbiota we have major changes in brain structure and function, and then also in behaviour."[8] In a pioneering study, a Japanese research team showed that mice raised without any gut bacteria had an exaggerated physical response to

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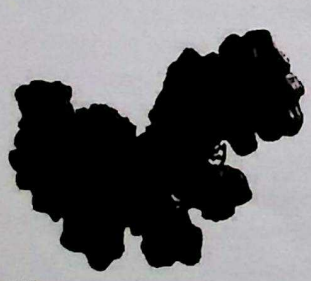
stress, releasing more hormone than mice that had a full complement of bacteria.

However, this effect could be reduced in bacteria-free mice by repopulating their gut with *Bifidobacterium infantis*, one of the major symbiotic bacteria found in the gut. Cryan's team built on this finding, showing that this effect could be reproduced even in healthy mice. "We took healthy mice and fed them *Lactobacillus* (another common gut bacteria), and we showed that these animals had a reduced stress response and when this bacteria was fed to mice it reduced stress and anxiety. But why should bacteria in the gut affect the brain? There are several different ways that messages can be sent from one organ to the other. It can be hormones or immune cells via the bloodstream, or by impulses along the vagus nerve, which stretches from the brain to intertwine closely with the gut. Through these pathways, actions in one produce effects in the other.

E. Coli Prefer the Best Sugar to Consume

When bacteria grow on a mixture of high and low-growth-rate sugars, the growth process occurs in two distinct ways. By the simple but elegant procedure of mixing the sugars in various proportions, Jacques Monod, proved that the bacteria completely consumed the preferred sugar before starting to consume the less rapidly utilized sugar. This was a striking discovery. Monod called the two-stage growth process *diauxy*, which means "double growth." It implied that the bacteria could distinguish between the two sugars and adjust their metabolism to utilize the preferred sugar first until it was completely consumed. Then, when the preferred sugar was no longer available, the bacteria took a certain time to readjust their metabolism and subsequently began to utilize the less rapidly utilized sugar. Bacteria constantly pick up information from inside and outside the cell and function adaptively based on what they have sensed. A key example dates back to pre-molecular days, when Jacques Monod (1942) demonstrated that *E. coli* can discriminate between the sugars glucose and lactose.[9] The molecular biology underlying this discrimination is now well known and serves as the basis for understanding how cells express genomic protein coding information.



Bacterial Cooperation and Altruism

Furthermore, bacteria cooperate: they can group together to take on tasks that would be difficult or impossible for one to handle alone. In a textbook example, millions of individuals of the species *Myxococcus xanthus* can bunch up to form a "predatory" colony that moves and changes direction collectively toward possible food sources. In nature, when *M. xanthus* swarming cells are unable to find sufficient nutrients, they enter a developmental process in which they aggregate forming raised pigmented mounds, termed fruiting bodies. Within the fruiting bodies cells

differentiate to form spores. Spores are metabolically dormant cells that can withstand prolonged periods of starvation.[10] Some examples of bacterial cooperation have even led researchers to propose that bacteria exhibit a form of altruism. For instance, some strains of *Escherichia coli* commit suicide when infected by a virus, thereby protecting their bacterial neighbors from infection.[11] The bacteria are not putting themselves at risk for the sake of others they are actively switching on death-pathways. A bacteria that activates a death pathway will die.

CRISPER Cas9 immune system in bacteria

Clustered regularly interspaced short palindromic repeats (CRISPR, pronounced crisper[12]) are segments of prokaryotic DNA containing short, repetitive base sequences. These play a key role in a bacterial defence system,[13] and form the basis of a genome editing technology known as CRISPR-Cas9 that allows permanent modification of genes within organisms.[14,] In a palindromic repeat, the sequence of nucleotides is the same in both directions. Each repetition is followed by short segments of spacer DNA from previous exposures to foreign DNA (e.g., a virus or plasmid).[15]
The CRISPR/Cas system is a prokaryotic immune system that confers resistance to foreign genetic elements such as those present within plasmids and phages[16,17,) that provides a form of acquired immunity. A simple version of the CRISPR/Cas genome editing techniques have many potential applications, including medicine and crop seed enhancement.

Cascade (CRISPR-associated complex for antiviral defense)

Conclusion: Bacteria Refutes the Dogma that the Mind is Inside the Brain

In consciousness studies the mind is assumed to correlate with the integrated activity of large populations of neurons distributed across multiple cortical and subcortical brain regions.[18] Plant and bacterial offers a direct challenge to this simplistic view of consciousness. Even though without neurons (without brain organ) both plants[19] and bacteria can also display several sentient behavior. Not only unicellular organisms can display cognitive behavior, but also the individual cells in the multicellular organisms also display individual cognitive behavior. Gametes of multicellular living entities exhibit intelligent cell-cell communication and chemotaxis.[20] Sperm cells and oocytes use several cognitive transmitters.[21] Even plants cells also have sensory perception and integration of these multiple sensory perceptions into adaptive actions helps them in signaling and communication.[22] Plant cells and neurons in other multicellular organisms produce sentient action potentials.[23] Root cells of plants exhibit sentient features at the transition zone interpolated between the apical meristem and elongation region.[24]

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Talk 4:

Concept of Body and Mind in Vedic Philosophies

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The mind–body problem is the question of how the human mind and body can causally interact. This question arises when the mind and body are considered as distinct, based on the premise that the mind and the body are essentially dissimilar in nature. One of the earliest known formulations of mind–body dualism was expressed in the eastern Samkhya and Yoga of Vedic ideology (c. 650 BCE), which divided the world into Purusha and Prakriti. Specifically, the Yoga Sutra presents an exploratorytechnique to the nature of the mind.

The problem was addressed by René Descartes (1641) in the 17th century, resulting in Cartesian dualism, and by pre-Aristotelian philosophers, in Avicennian philosophy, and in previous Asian societies. A diversity of methodologies has been suggested. Most of them are either dualist or monist. Dualism maintains an inelastic dissimilarities between the realms of mind and matter. Monism maintains that there is only one combining genuineness, constituent or spirit in terms of which everything can be clarified.

Numerous philosophical viewpoints have been established which throw away the mind–body contradiction. The historical materialism of Karl Marx and subsequent writers, itself a form of physicalism, held that consciousness was engendered by the material contingencies of one's environment. A clear refusal of the contradiction is found in French structuralism, and is a situation that normally considered post-war French philosophy.

In the western philosophical tradition there are numerous philosophers since ancient time to modern those discussed to solve the contrast of dualism. Plato, Aristotle, René Descartes, Immanuel Kant, Huxley, Whitehead, Popper and John Searle etc., are contributors to the western mind body problem.

Such a dualistic contrast are also found in Vedic philosophical traditions since Vedic period and onwards. Here, I will try to examine mind-body concepts and relationship in Vedic philosophy, not as a problematic standpoint, but in informative prospective to raise interest to research in this field.

I want to strong note here that the substance Dualism is a collective feature of several Vedic Hindu faculties, including the Samkhya, Nyāya, Yoga and Dvaita Vedanta. In these faculties a vibrant

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alteration is drawn between matter and a non-material soul, which is eternal and undergoes Samsara, a series of death and rebirth.

The Nyāya philosophy argued that qualities such as cognition and desire are inborn qualities which are not controlled by anything solely material, and therefore by a process of abolition must belong to a non-material self, the Atman. Many of these philosophies see their spiritual goal as Moksha, liberation from the cycle of rebirth

The Vedas are considered to be source of whole knowledge of Vedic Nepalese traditions since ages as the Vedas are believed to be composed about 6000 BC to 1500 in the plains of Bharatbarsha or caves of Himalayan ranges by contemporary academics. But traditional Hindu community accepts as true that Vedas are immortal and composed by none, but realized and reveled by spiritually qualified self-realized Risis in Samadhi. Veda is ultimate, unlimited, immutable, absolute and immortal properties of Brahma wherein all seed of entire universe contains as a word - form that is known as Shabda Brahma in practical world.

Thus, the Samadhi is most qualified and highest position of Tapa, where a spiritually qualified Rise or other pinancing individual can accomplish favorite and required power for material or divine purpose. It is called Tapa. I don't see any proper English synonyms of Tapa. It is told that Brahma, the creator of the universe, went to Tapa before starting creating the universe that he could achieve unlimited power to complete the creation of the universal properties including Human.

There are several instances in Rigveda. According to some hymns the body is the residence of Atma what is Brahma himself. The human body is created by five gross materials. Body शरीर, Mind मनस् and finally; the Atman आत्मा are Vedic construction of mind body relationship. Atman is bearer, owner as well as consumer of Body and Mind affairs without being affected worldly phenomenon related M&B. Vedic understanding about the body is very clear. The body means the physical appearance of human feature winch includes five sense organs and five motor organ.

Nasadaiya sutra clearly has mentioned that the body is responsible for bodily properties and the mind is the regulatory authority of a body when decision making process of actions. If there is no body, the decision about an action is not possible. According to Vedic philosophical traditions, the body is represented of animal conditions: food, sleep, fear and sex and the Mind make human distinct from the animal world. Notion ज्ञान is the property which makes human distinct from animals.

The Upanishads are also carrying the idealistic concept as they are carrier of monastic schools. "There are two birds on the tree of eternity. One wanted to test worldly pleasureand fell down body life and another remain on the tree. Bodily Atma started to be contaminated within a body with intervening of Maya and forgot the real position. But this dualism is totally different than the western mind-body problem. In Vedic philosophical properties, the Men are part of the material world, not a soul. Thus, there is not same union problem as western dualism facing.

Samkhya is body and Yoga philosophy is mind. Samkhya is the theoretical expression of Mind and Yoga philosophy is a practical union of Mind with the body. In my opinion, the western concept of Mind is related to intellectual properties, but the word "Mana" or मनस् has more properties of emotions. Yoga philosophy tried to Combine Mana and Mind as Chitta. The cheetah is the vessel or the mixing pot where the body and mind get together to interact with pure प्रज्ञा.Chitta can't be compared with Descartes's dualism. In Descartes there is no final solution of the dualism but Yoga philosophy clearly achieves the goal of unity in Samadhi what is recognized as Moksha. Moksha is the common goal of almost all Vedic philosophies.

Yoga philosophy is also essentially dualist in nature, but concept of body and mind is different than western dualism. According to yoga the Manas is the directing power behind all actions. It possesses the capacity of attention, selection, etc.; it synthesizes the discrete manifold of the sensations. It can perceive, but cannot conceive, and constituted as Chitta and ChittaVritii in the theoretical world.

Buddhist traditions describe that the mind manifests moment to moment as sense impressions and mental phenomena that are continuously changing. The moment-by-moment manifestation of the mind-stream has been described as happening in every person all the time, even in a scientist who analyses various phenomena in the world, or analyses the material body including the organ brain. The manifestation of the mind-stream is also described as being influenced by physical laws, biological laws, psychological laws, volitional laws, and universal laws.

A noticeable feature of Buddhist philosophy which sets it apart from Vedic tradition is the importance of the doctrine of not-self or अनात्मा The Buddha's not-self doctrine sees humans as an impermanent composite of five psychological and physical aspects instead of a single fixed shelf. In this sense, what is called ego or the self is merely a convenient fiction, a delusion that does not apply to anything actual but in a mistaken way of looking at the ever changing torrent of five unified aggregate features. The affiliation between these aggregates is said to be one of dependent-arising. This means that all things, including mental events, a rise co-dependently from a plurality of other causes and conditions. This seems to reject both causal determinist and epiphenomenalism conceptions of mind.

More notes, the Vedic concept of the human body is equally material and spiritual. The Upanishad says that the body is manifestation several Gods and goddess. The body has a full replica of the universe, what is called Biswarupa (chhadogya and SrimadBhagwatam 2/2) and mind is a bodily property which exposed several emotions. The Buddha is the controller of body and mind both. We should not confuse that the consciousness is the replica of the Soul or Purusha, which is never contaminated with bodily affairs.

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Nyaya, Vaiseshika, Shankar Vedanta, RamanujaVedant also has domestic approaches, buteven those philosophies the mind is part of the bodily subject controlled by Buddha. In this respect, there is clear that the western concept of the mind body problem does not exist in the Vedic philosophical tradition. Hence, we can't ignore the union or first causal problem of evolution in Samkhya philosophy as well.

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Talk 5:

Near Death Experience – what we know, what we don't know

Garga Chatterjee (Indian Statistical Institute, Kolkata, India) & Dhairyya Singh (Ashoka University, Delhi, India)

A near death experience, as it is generally referred to, is a cognitive phenomenon that is often spiritual or transcendental in nature and which occurs in association with some degree of acute physiological and/or psychological trauma. As the name suggests, NDEs in this general definition refer only to experiences where a person is either close to being dead, such as when suffering from a cardiac arrest, or believes he is close to being dead, such as during an accident (Moore & Greyson, 2017). However, curiously, as Parnia (2017) has pointed out, the scholarly study of NDEs has been rife with inclusions of experiences which occur without any association with critical illness or death being categorized as NDEs. These may include many kinds of mystical or spiritual experiences such as when using recreational hallucinogenic drugs which, while sharing features with NDEs, actually do not occur while the person is physiologically or psychologically near-death. This, according to Parnia, is because the NDE is not a well-defined term and in order for the scholarly study to progress, what is categorized as an NDE should be strictly constrained to only those experiences which fit certain criteria of being near-death. Parnia, therefore, proposes that perhaps only those NDEs which occur in correspondence with cardiac arrest should be categorized as NDEs since cardiac arrest is the most appropriate physiological marker of death (Parnia, Death and consciousness--an overview of the mental and cognitive experience of death., 2014).

There are however several problems with this. For one, it excludes many experiences which occur when there is a psychological nearness to death (i.e. a person feels they will die) but there is no cardiac arrest. Another problem is that while it is true that a complete cardiac arrest is the best marker we have of death (since the stopping of the heart is essentially how death occurs), it is unclear from the literature *how* near one must be to death to have an NDE. Specifically, why does one have to be as near to death as losing heart function for their experience to be categorized as an NDE? There are no obvious solutions or answers for both these problems because as Parnia states, the specific line where someone is near-death is ill-defined (2017).

Importantly, it is also necessary to discriminate between NDEs and out of body experiences (OBEs), which are a broader class of events where one typically feels that they are floating outside of their body and can see themselves from the outside (Green, 1968; Monroe, 1971). Often, NDEs are considered to be a type of OBE, but there are many important differences in their phenomenology. While NDEs are often reported as a kind of dissociative event, they don't necessarily involve an experience of feeling out of one's body (although many people do report feeling like they were outside their body). OBEs, on the other hand, through their very definition, have to involve such a feeling. Further, OBEs are events that are thought to have a more mundane psychological effect and can be deliberately induced repeatedly and with reliability (Brent, 1979), while NDEs are intense phenomena which cannot be deliberately induced – they often occur during severe trauma and seem to have a very different psychological effect, as compared to OBEs (Groth-Marnat & Schumaker, 1989). Given these phenomenological differences, it is unclear why NDEs are thought to be a type of OBE.

It is important to keep in mind the caveat, therefore, that the NDE remains a nebulous and imprecise term and requires refinement before major conclusions can be drawn from the literature. That said, this paper will attempt to review and summarize the sizeable literature that has been generated over the last 50 years on (a) the phenomenal psychological experience of an NDE, (b) the

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neurological and cognitive bases of NDEs. Due to the definitional problems mentioned above, we will qualify each study with the specific criteria the authors used to identify NDEs in both sections, wherever it may be relevant. We will end the paper with a discussion on the steps ahead in NDE research and what specific areas need more work.

Section A: The phenomenological experience of an NDE

Unlike the vast differences present in the psychophysiological states of people categorized as having an NDE, there are remarkable similarities in the psychological accounts of those who report having gone through the experience. Ring (1979), in a study with participants (n = 102) who reported having an NDE found that the most common features were peace (experienced by 60% of the participants), out-of-body-experiences (37%), entering the darkness (23%), seeing the light (16%) and entering the light (10%). Ring categorized these features as 'stages' that one entered, where 60% of the participants entered the first stage but only 10% reported entering the last (1979; 1980, p. 40). Moody (1975), through a study involving 150 cases of people who had been declared clinically dead and then resuscitated, found that other common features of NDEs include meeting spirit-like persons who could be deceased friends or relatives; encountering God, Christ or angels; seeing one's life reviewed in front of one's eyes; feeling a reluctance in entering back into one's body; and perceiving a border region that could not be crossed.

Greyson (1983), through an analysis of responses from 67 participants who claimed to have an NDE, either in association with complications in surgery, accidents, cardiac arrests, or during suicide attempts, constructed a 16-item scale by which the phenomenology of an NDE could be quantified. The scale was divided into 4 major domains including cognitive experiences, which included questions such as "Did time seem to speed up?", affective experiences, with questions such as "Did you feel a sense of harmony or unity with the universe?", paranormal experiences with questions such as "Did scenes from the future come to you?" and transcendental experiences with questions such as "Did you seem to encounter a mystical being or presence?". The scale was shown to have good psychometric properties, such as a high internal consistency, split-reliability, test-retest reliability and seemed to have good content validity in that it encompassed all the various phenomenological features one experiences during an NDE (Greyson, 1983).

While most of these studies identify an NDE as an overall pleasant (or at least not an unpleasant) experience, Rawlings (1975), in his studies found that up to half of the participants who reported having an NDE had an intensely distressing or "hellish" experience. Similarly, Garfield (1977) reported that 22% of the NDE cases he studied included an uncomfortable experience. It is widely accepted, however, that there don't seem to be many differences in the kinds of experiences one goes through based on demographic factors within a culture. For example, one's sex (Sabom, 1982; Thomas, Cooper, & Suscovich, 1982), age (Greyson, 1983; Bush, 1983; Morse, Connor, & Tyler, 1985), race, education, religiosity (Ring, 1979), or personality (Locke & Shontz, 1983) don't seem be associated with variations in NDE patterns.

There are, however, cultural differences in how NDEs are perceived and interpreted. Osis and Haraldson (1973), for example, conducted a comparative study of hospital personnel in the US and India, by asking them to respond to a survey on the experiences of dying people. They found that while US patients were more likely to see their loved ones during an NDE, Indians saw religious entities more often. This can perhaps be ascribed to the differences in socialization on the importance of religion between the two cultures. Additionally, most Americans were willing to die while Indians generally responded with a reluctance to leave (Osis & Haraldson, 1973). Indians also seem to have a lower probability of having an out-of-body experience as compared to people of other cultures (Pasricha & Stevenson, 1986). Belanti and colleagues noted in a cross-cultural review of NDE phenomenology that in general, western and non-western prototype NDEs seem to be similar, but vary specifically in the presence of the relevant cultural and religious figures (Belanti, Perera, & Jagadheesan, 2008). Many non-western cultures such as those of Thailand, India and the Mapuche people of Chile and Argentina also lacked visions of light, tunnels or any evidence of life review (Belanti, Perera, & Jagadheesan, 2008).

There also have been reports of differences in NDE patterns based on what physiological and psychological conditions the NDE was associated with. For example, Noes and colleagues conducted a factor analysis of NDE patterns into three distinct domains including hyper-alertness, detachment/depersonalization and transcendental/mystical events and found that the experience of hyper-alertness was more frequent with accident victims as compared to clinical-death cases (Noes, Hoenk, Kuperman, & Slymen, 1977). This could perhaps be a result of post-traumatic stress. Sabom (1982) also notes that one is most likely to have an NDE if one is in the hospital and has been resuscitated. Further, if one believes that they are likely to die, the chances of having an NDE increase substantially and the intensity of the experience increases as well (Noes & Kletti, 1979). Interestingly, those who have NDEs in association with serious illness seem to have more mystical events in comparison to those who have NDEs in association with other states, and those who are drowning victims report a greater intensity of visual imagery (Noes & Slymen, 1979).

All in all, while it is true that the majority of NDEs have very similar phenomenology, it is also the case that there is variety in some of the specific features one experiences in different conditions. Depending, up to a limited extent, on which psychophysiological state one is in and which culture one belongs to, there can be significant variation in the events one experiences as part of an NDE. Importantly, in this section, we have not reviewed the literature on the phenomenology of OBEs in association with events like hallucinogenic drug use or lucid dreaming, because while it is true that these experiences have a lot in common with NDEs, we do not believe they can be categorized as such because of their lack of association with a proximity to death in the experiencer.

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Section B: The Neurological and Cognitive Basis for NDEs

One of the most important things to note when discussing the mechanisms underlying an NDE is that from a physiological perspective, a person going through an NDE often already has severe biological trauma which may make it difficult to accurately isolate the neurological substrate of the experience (Konopka, 2015). For example, the brain of a person who has undergone cardiac arrest stops receiving oxygen, which may result in serious structural damage to the brain (Freeman & Hedges, 2003). People who go through other life-threatening accidents or illness may have damage in other parts of the nervous system. These variations highlight an important caveat in identifying a neurological basis for NDEs from the available empirical work.

Regardless, scholars have long speculated on how specific aspects of brain injury may cause patients to have NDEs. For example, Carr (1982) proposed that temporal lobe malfunction could be responsible for many of the phenomenological aspects of NDEs. Kolb and Winshaw (1990) have noted that disturbance of visual perception is one of the major outcomes of damage to the temporal lobe and perhaps it is distortions in visual perception which lead an NDE experiencer to see specific visions of light, tunnels, deceased loved ones or God (Carr, 1982). Indeed, as first pointed out by Saavedra-Aguilar and Gomez-Jeria, (1989) there are remarkable similarities in the experiences of temporal lobe epilepsy (TLE) patients and those who have experienced NDEs. For example, just like NDE experiencers, TLE patients, when having a TLE episode, also report feeling a presence, having out-of-body experiences, having flashbacks, and feeling strange and mystical energies (Saavedra-Aguilar & Gomez-Jeria, 1989). Along with this, they also report feeling a sense of peace and serenity and having extensively distorted visual and auditory perception. Carr (1981) also proposed the possible role of endorphins in NDEs as a possible source of the feelings of calm and peace and Saavedra-Aguilar and Gomez-Jeria (1989) have constructed a model of NDE phenomenology based only on temporal lobe dysfunction and stress-induced neuropeptide and neurotransmitter release which can explain much of the phenomenology of NDEs. Further evidence in support of the model is also provided by the work of Penfield (1958), who showed through experiments that the surgical stimulation of the temporal lobes led to many NDE-related experiences such as hallucinations, visual distortions and a feeling of peace and joy. The empirical work of Britton and Booztin (2014) also showed that NDEs were associated, to a large extent, with altered temporal lobe functioning.

Scholars have invoked several other physiological processes that could explain specific aspects of NDEs as well. For example, the hypoxia caused by cardiac arrests has been proposed to cause a sense of wellbeing, hallucinations and an impairment of judgement due to the brain being deprived of oxygen (Rodin, 1980). It is also striking that many drugs tend to cause experiences that are very similar to NDEs. For example, Corazza and Schifano (2010) reported in a study of a sample of 50 ketamine abusers that up to 90% of the abusers had an NDE-like experience in just the first few occasions of drug intake. The experience often included an alerted perception of time (90% cases), an out-of-body experience (88%) and a sense of peace or joy (76%). Hashish has also been known to cause experiences that are similar to NDEs, which include feelings of peace and joy and the sensing of a cosmic connection (Siegel & Hirschman, 1984). It is likely that many of the pathways that are activated through the use of these drugs are also activated in the perception of an NDE, which is what perhaps explains the similarity in the experiences. The pathways associated with these drugs, therefore, provide helpful clues into what the neurological substrates of NDEs might be.

While the various physiological factors that are associated with NDEs might explain the general outcomes that are part of an NDE, such as the sense of peace or a feeling of dissociation, the specific content of the various aspects of NDEs cannot be explained through a purely neurological framework. For instance, while general visual distortions may be explained by damage to the temporal lobe, the nature of the hallucinations including who one sees as appearing, whether the nature of the hallucination is religious etc. can be best explained by cognitive factors. This is especially evident because of the role of the temporal lobes in NDEs. As has been pointed out by Blanke and Thut (2007), the temporal lobes are also associated with memory retrieval and stimulation of the lobes has been shown to induce flashbacks. This perhaps explains why NDEs are populated with content from memory, such as the presence of deceased family members or God and the perception of a life review. The content of an NDE may also be affected by prior expectations of what a person may believe death is like. This claim is supported by the cultural variance in NDE patterns that suggest that the expectations one holds based on cultural information affects what one experiences during an NDE.

Discussion

In this paper, we discussed both the phenomenology and the possible neurological and cognitive underpinnings of NDEs by reviewing the literature that has been generated over the past 50 years. Section A traced the development of the understanding of what the phenomenology of an NDE is like. From initial work summarizing the reports of multiple experiencers, we also reviewed later work which consolidated the gold standard instrument used to evaluate the extent to which one's experience is similar to an NDE – The Greyson Near-Death Experience Scale (1983). Section B emphasized the extensive similarities between NDEs and various other experiences, which highlight the possible areas of interest for future exploratory work and also identified the cognitive factors that may be behind the content of NDE experience.

We believe that one of the key problems that requires attention in that of adequately refining the NDE construct. Currently it is an ill-defined term which, due to its similarities with many other experiences, such as hallucinogenic drug use and various kinds of out-of-body experiences, has been indiscriminately invoked to explain many different kinds of experiences (Parnia, 2017). This makes it difficult to pin down both the phenomenology of the experience, as well as the neurological basis for the experience, and therefore the above summaries should be read with caution. One way to refine the construct would be to decide what kinds of physiological and psychological conditions actually qualify as near-death. While,

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the reasoning behind such a qualification may initially seem arbitrary, it is still critically important to draw the appropriate lines so that the construct actually means something narrow and precise.

Another future direction is empirical work examining NDEs directly. Until now, there has been almost no controlled study of what exactly occurs physiologically during and NDE and most of the psychological insights come from participants reporting from memory and researchers trying to estimate the 'realness' of the memory. Future work needs to report more specifically on, at the very least, the physiological phenomena occurring while an NDE is occurring. This could happen, for example, by studying those approaching death more carefully. Finally, while the purview of this paper did not include a review of the after-effects of NDEs, they are an important aspect of the phenomenon. Much of the work studying the after-effects of NDEs has shown that NDEs often have a life-changing impact on the experiencer and that the experience is generally a positive one. However, more work is required in examining NDEs occurring in different situations so that our understanding of its long and short-term after-effects broadens.

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19th August 2017
(Saturday)

Session: Exploring the Mysteries of Life

Chairpersons: Joan Walton, Ph.D., *Primary Ph.D. Supervisor, Department of Education Studies, Faculty of Education, Liverpool Hope University, UK*
&
B. S. Shankaranarayana Rao, Ph.D., *Professor, Department of Neurophysiology, National Institute of Mental Health and Neurosciences, Bengaluru, Indi*

Talk 1:

Unification of Objective Realism and Spiritual Development

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1. Introduction

Deep cultural divisions have appeared in recent years, more and more destructive all over the earth, as humans align themselves on a spectrum of opinion and belief which ranges from extreme materialism asserting the "what you see (in this world) is what you get," to religious fanaticism which views science as the enemy of the human spirit[1].

There are many psychological and economic factors which contribute to these conflicts, but there is also a fundamental question which should concern anyone clear enough of mind to appreciate how serious it is: how can we reconcile the full range of things we can learn from hard-core third party science [2] and laboratory experiments, with the full range of spiritual experience which has been observed and studied across the entire planet [3]?

This paper will present one possible way to answer this question. I do not claim that a sane and skeptical person should immediately feel convinced about the new synthesis proposed here; however, it is one possibility which a sane human should include in the repertoire of what he or she considers. It will be concrete and definite in a way which may make it more useful, in guiding further exploration of experimental and spiritual experience, than more ambiguous answers based more purely on words.

The paper will describe how to unify two core ideas which seem to be far apart, and more extreme than what most people now believe:

(1) **Einsteinian Materialism,** which I define here as the idea that our entire cosmos is a 3+1-dimensional space time, curved as described by Einstein, and that everything which exists in this cosmos (including our minds) is an aspect of the real substance, which is a set of smooth mathematical functions over space-time, governed by partial differential equations following the mathematical framework developed long ago by Lagrange, Euler and Hamilton;

(2) **Cosmic Consciousness,** which I define here as the idea that the human mind is far greater than the information layer of the brain, that the cosmos is full of higher intelligence, that humans should use strategic intelligent disciplines (like yoga and its cousins from other cultures) to express their natural will towards spiritual growth, in a way which connects us more and more to higher intelligence.

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When I first discussed this viewpoint with Karl Pribram, a great pioneer in trying to connect neuroscience with psychology and psychiatry, he said to me: "People challenge me all the time from the right (materialism) and from the left, but never before have I met someone so far both to the left of me and to the right at the same time. Perhaps I might agree with you about the soul, but people have already diminished my work because of how far I have already tried to go to open people up to that kind of reality."

Many physicists are not yet aware of new results which make it tenable to be so "right wing" as Einstein was. Section 2 will summarize those new results, and their startling implications for consciousness, even in a mundane view of the cosmos. Section 3 will explain why it was very rational for me to believe in a mundane, spirit-free understanding of life, before 1967, and why it was even more rational for me to change my views, starting in 1967, and where this took me.

1. Einstein Materialism

Many introductory courses in quantum mechanics begin by explaining that the concept of objective reality is entirely obsolete, because of the new theory developed by Heisenberg in the 1920's which is the dominant theory of physics today.

In actuality, that is a gross oversimplification. The first version of quantum mechanics, applying a surprising twist to the original equation (a partial differential equation, PDE) developed by Schrodinger, was not consistent with relativity, and could not predict many features of the interaction of particles with electromagnetic fields. These problems were solve in later years, first by a Dirac (who developed a relativistic theory) and then by Schwinger, Feynman, Dyson and Tomonoga, who won the Nobel Prize for a new theory called Canonical Quantum Electrodynamics (QED) [4-6]. But practical researchers studying electrodynamics often use other formulations of QED, like Cavity QED (CQED) and Feynman path QED (FQED), developed in later years. I use the acronym "KQED" for the Kopenhagen or Canonical version, because the acronym "CQED" is already taken, even though CQED was developed much later than KQED.

The concept of objective reality became unpopular in physics by 1950, because people found it hard to build realistic theories which could predict even what Heisenberg's old version could predict. But it was not refuted, only unpopular. Einstein and others expressed hope that new work in PDE could result in new realistic theories which explain quantum mechanics as a kind of emergent statistical description of something deeper and realistic.

The concept of objective reality regained much of its popularity in the late 1950's, when Hugh Everett and John Wheeler proposed a new version of QED (and of quantum field theory QFT in general [7]) which was able to restore the idea of objective reality, but only at the cost of assuming that we live in an infinite-dimensional cosmos, and that the mundane "universe" we live in is just one slice through that larger "multiverse."

KQED is not a theory of how the cosmos works. It is a theory of how to make predictions of QED experiments. The recipe for making predictions is composed of two parts: (1) a "new Schrodinger equation," actually the normal form Maxwell-Dirac equation, which describes the evolution of a 'wave function" ψ over the the multiverse (more formally, over Fock-Hilbert space); and (2) a 'measurement formalism" which gives the probabilities for measured outcomes of an experiment, depending on the wave function emerging at the end of the experiment. The famous 'collapse of the wave function" is part of the Copenhagen measurement formalism. Everett merely proposed that the wave function is the actual substance of the cosmos we live in, and that the Copenhagen measurement formulas might be deduced somehow from the Maxwell-Dirac dynamics.

DeWitt argued that the Everett theory and KQED do have testable differences, but very small differences, which we could never hope to test. Many people, staring at the Everett model, concluded, that the different parallel universes could never communicate with each other, so that the parallel universes are a moot point. This is what inspired many philosophers to joyfully extrapolate too far, and assume that different versions of quantum mechanics are just a difference in interpretations (a subject to be studied via hermeneutics and other word games) rather than a difference in theories to be resolved by science. Everett may have said: "You now have a choice. You can either believe there is no objective reality at all out there, or you can believe it is precisely as weird as I say. To understand the weirdness which is certainly there, why not accept my version?"

David Deutsch, the father of modern digital quantum computing [8,9] changed this story in a very important way. He extended the many-worlds theory, and showed how we can build computers which, in effect, put multiple parallel universes to work in an integrated way, yielding results which combine what is calculated in different universes. This suggest that minds could exist in our quantum universe which combine across the parallel universes, even though mundane human brains do not. Still, other versions of QED were generally able to explain the broad features of the Deutsch designs, even though there were important technical debates about issues like zero-point decoherence and such.

But again, none of this really disproved Einsteinian realism. A host of respected mathematicians, like Wiener and Wigner and Von Neumann, attempted to show that quantum mechanics (pre-QED) could be deduced as a statistical outcome of a PDE theory, but failed. Von Neumann's classic study showed that no PDE theory could possibly reproduced all the predictions of Copenhagen quantum mechanics [10], but no one has ever tested **all** the predictions of quantum theory. In analyzing what he learned from ghis exercise, Von Neumann suggested that the problem was probably due to the conventional way in which the idea of "causality" is translated into mathematics. This insight is key to the new picture today, as we finally start to catch up to the deep understanding of that great mathematician.

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The real, strict beginning of the end for Einsteinian materialism came, according to the mainstream, when Einstein, Podolsky and Rosen (EPR) proposed an experiment which Einstein thought would be a decisive test to disprove Heisenberg's theory. That proposal was refined into a more specific proposal for a new experiment, commonly called the "Bell's Theorem" experiment, specified in the pivotal "CHSH" paper cited by Bell [11] and reviewed in detail by Clauser and Shimony [12].

Most people who write about Bell's Theorem learn about it from [11] or from less primary sources. The conventional wisdom is: "the Bell's Theorem experiments immediately disproved Einsteinian realism, because Einsteinian realism assumes no action at a distance. The experiment rules out all possible theories of physics which are both local and realistic." The Everett theory was allowed, since it does not meet the definition of "locality" in the CHSH Theorem.

I was very lucky, in graduate school in the early 1970's, to have frequent contact over tea with Richard Holt, the graduate student who performed one of the two early CHSH experiments described in the CHSH paper, which he co-authored and showed me at the time. The original paper attempts to rule out all theories of physics which have all three properties: (1) locality; (2) "hidden variables" (defined as objective reality); and (3) "causality" as defined by the curious time-asymmetric statistical definition which Von Neumann warned us about.

I was the first person to note [13] that local realism, even Einsteinian materialism, could possibly be made to work, in theory, by violating the third assumption, by modernizing the statistical formulation of "causality," in a way which reflects the kind of statistical outcome we should expect when deriving the statistics of a time-symmetric dynamical system, like Maxwell-Dirac or like time-symmetric PDE. In 1988, I made that point even more emphatically, at the same seminal conference [14] where Greenerger, Horne and Zeilinger presented their breakthrough concept of triple entanglement (GHZ states).

Many physicists are now aware that the usual Copenhagen measurement formalism cannot really be deduced from the Maxwell-Dirac dynamics assumed in many-worlds QED. In 2008, I pointed this out, in a paper [15] showing how a different measurement formalism can be deduced from Maxwell-Dirac dynamics. That paper spelled out the rules for new models of macroscopic measurement objects, like polarizers, based on that analysis. This paper [15] defines my version of **time-symmetric physics**, which is more specific than other meanings of that phrase which other authors and I used before then.

This immediately leads to the central question important to all versions of QED: does the Copenhagen measurement formalism always agree with the time-symmetric formalism/rules, and, if not, could we perform a decisive experiment to rule out at least one of them (hopefully not both)? Ludmilla Dolmatova and I answered that question in a series of papers through 2015 [16], which specified a decisive experiment, the all-angles triphoton experiment, which could be performed easily enough in any laboratory already producing the asymmetric GHZ state, simply by doing the same experiment as before but with a more complete selection of angles with the polarizers. More recently we have developed an even simpler design for experiment [17], which I hope can be performed and written up more completely relatively soon.

In principle, if either of these experiments ([16] or [17]) supports the collapse of the wave function, it rules out time-symmetric physics, and it rules out the last hope for local realistic theories like Einstein materialism. It also rules out correcting the many-worlds theory by using time-symmetric physics as the new measurement formalism to go with the Maxwell-Dirac dynamics.

However, if the experiment favors time-symmetric physics (as I strongly expect based on the logic in [15], reinforced by experiments and experiences on human abilities), we are in a new era. In that new era, I would propose that we explore two different theories of physics in parallel:

(1) Modified or Markov QED, which I mentioned in [16] but will hereby define more precisely. MQED is defined as that version of QED which assumes normal form Maxwell-Dirac dynamics, combined with a measurement formalism compliant with the rules of time-symmetric physics as specified in [15] and [16];

(2) A deeper PDE theory, not yet specified but "just over the horizon" [18] which I now can envision ever more clearly month by month.

Of course, (1) is already well-specified enough to suggest many new technologies, building on the new experiments [1, 16,17]. If I really could split myself into two tracks, perhaps one should push MQED as hard and as far as it can go, with many industrial follow-ons, while another would continue the hunt for the deeper Lagrangian – with an open mind towards more complex types of local realistic model, or other testable models. Full understanding requires both, in my view.

By 2014, I felt a deep conflict here about the choice between the many-worlds view. My understanding of physics strongly pointed more and more towards Einsteinian realism, yet spiritual experience pointed more and more to the notion of a many-worlds cosmos. My natural interpretation of Einsteinian realism and time-symmetric physics fit very nicely with the "Oxford standard model of time travel" (minus the travel part) portrayed so well in a series by Connie Willis[19], and even more clearly and simply by Robert Wilson [20]. But experience cast more and more doubt on that (as it did for Willis's characters).

Resolution came in 2014. I remember very vividly the time when I developed and stared at the equations of the cMRF time-symmetric model of the dichroic polarizer (reviewed in [16]) and projected my imagination into the situation of a photon propagating through a polarized crystal, where it uses a mix of

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three responses: (1) conform, and be totally absorbed; (2) go 90 degrees out from the conformist position; (3) declare that those choices are both unacceptable, and retroactively reduce the probability that this scenario happens at all. Living in an insanely polarized political environment, I wished for moment: "Why do photons have this choice, and I don't?" But then I realize I do. The patterns of force which constitute mundane human brain consciousness are also registered, in their own way, in parallel scenarios, just like patterns of photon spin. The price is that our mundane consciousness is NOT a pattern or the substance of the 3+1-D universe, even if one believes in that; for all practical purposes, MQED is what governs our mundane lives, and we do have parallel copies, as in the many-worlds theory [21].

Our mundane consciousness, brains and minds are all just shadows of the one reality, which obviously must be even more complex and weird than MQED if it is a PDE system. PDE systems are not as simple and limited as most people imagine.

Again, this is all a consequence of mundane laboratory physics. Mundane physics using QED can build computers and minds which are not limited to just one scenario or one "universe", but it seems obvious that our mundane brains are limited in this way.

2. Opening the Inner Eyes and Attaining Cosmic Consciousness

The psychologist B.F. Skinner once argued that the brains and learning rules of humans are exactly the same as those of rats (except for speed and volume). To show this, his followers would at times train rats to push words around, as they would push other objects around, in a solipsistic kind of way, consistent with the "word games" theory of language [22]. Some humans do at times seem to think like rats, but modern research on mirror neurons has led to a totally different picture of where we stand, as a kind of half-way house in evolution of the brain [23]. Some of us build on our inborn, mundane capabilities for empathy and communication so much that we maintain a well-structured system of symbolic reasoning, complete with axioms, logic and probability assessment. Those of us who make more use of words in making decisions also become more dependent on them – more precisely, more dependent on our choice of axioms. With the wrong axioms, humans have unique ways of having nervous breakdowns and acting on ideas so crazy or so misleading that no self-respecting mouse would ever be so stupid.

In 1967, on a verbal symbolic level, I was firmly committed to the belief that all that spiritual, religious and paranormal stuff is all total nonsense. There was good logic behind that belief, and I often say I deeply respect those who see the logic the same way that I did then, but there are limits to that respect, as I will explain. As I look back, I can also see that the nonverbal half of my mind (which I can remember directly, without intervention of words) was never so dogmatic.

My logic was essentially the same as the logic presented in D.O. Hebb's seminal book, the Organization of Behavior[24], which was second only to the work of Von Neumann as a birthplace of the neural network field. Hebb used parapsychology as an example to explain how fundamental Bayes' Law is to human learning, not only in science but in nonverbal learning.

"The probability that a theory is true is proportional to how well it fits experience("likelihood"), multiplied by its prior probability, the likelihood we would assign to it before any evidence. The parapsychologists have certainly passed all the usual likelihood tests we use in psychology, many times over, but since it is physically impossible, the prior probability term is so low that it outweighs the empirical likelihood." And then, if one considers such phenomena not to exist, one of course would look for explanations involving delusion or abuse. (For a more complete and modern account of Bayes' Law in learning, see [21,24] - which do not change this story.)

Actually, when I was 15 (in 1963), I did read the Upanishads, in the Hume translation, and was very excited by them. However, I was excited by the formal, logical constructs, which essentially offer a way of annotating the Einstein cosmos with values and ethics, but not changing the rules.

What happened to me in March, 1967 [25] was a personal experience so compelling that I could no longer assign a probability of zero to paranormal phenomena. It was more compelling to me than the experiences described by Greeley [3], because it came with veridical validation across time which I could not really question without questioning absolutely everything I thought I had experienced on earth. I decided then, rationally, to assign a 50-50 probability to this issue, and to be alert to any evidence one way or another on this important issue. With open eyes, I encountered more and more veridical experience. In the fall of 1971, a suitemate at Harvard showed me a small popular book on experiments to try with your kind, which culminated in an exercise in kundalini yoga, which led to results I found amazing (and veridical) the very first time. Early in 1972, I was very grateful for the book on how to survive raising kundalini, by Gopi Krisha; the methods he described were very important to my health and survival in that period.

More recently, maps have appeared for the distribution of dark energy in our cluster of galaxies, connecting those galaxies and making up the bulk of the mass-energy of the galaxy. More and more the "physically impossible" term seems weaker and weaker. Perhaps more and more of us are ready to explore these domains in a deeper way, strengthening both our knowledge of physics and neural networks, and our understanding of higher intelligence, in a way which shows ever more synergy.

In the past, I was careful to emphasize my respect for those whose experience base, like mine in January 1967, does not justify attributing any real possibility to spiritual or paranormal experience. But it is not such total respect. Even those who believe in a mundane cosmos should naturally evolve towards a state which I call mundane 'sanity" of "zhengqi" [21], which

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integrates the verbal and nonverbal parts of the brain without weakening logic. 'Sanity" usually is reflected in a sense of humor and a vivid concrete experience of life, not just in words, among other things. This opening of the full "eyes' of the mind and growth in capacity to handle complexity naturally attracts strange experiences [26] to a person, at least with time especially if one is mentally strong and sane enough to avoid the fear reactions [3] which contract the mind and send it into a weird combination of religious dogmatism and enforced mundane life, of fear of one's own shadow.

Not being afraid of my own shadow (at least when it doesn't act up on too large a scale), I concluded in 1972 that I needed to probe a lot further into the kind of knowledge which the book from my suitemate reflected – and, equally, to look for explanations and models of my growing database of first person experience (including more and more assimilated from others, subject to all the natural human mechanisms for staying tentative in early stages). At one time, early in the game, I considered the old theory that unknown forces might be exchanged between newly evolving receiving and transmitting organs in the brain/body, but that didn't explain enough. I experimented with various ideas of astral travel, learning methods from yogins, from other schools, adapted by modern neural network theory [22] and neuroscience experiments [27].

In the end, while I try very hard to be open-minded, I keep coming back more and more to what I sometimes call "the standard model of the soul," that [21]:

(1) We humans are a symbiotic life-form, a symbiosis between our mundane brain/body and our own local interface/component of 'the noosphere," a great mind with its own great body, made up in great part of some form of dark matter, basically including all of the earth;

(2) When we do "astral travel" (or go to the mental or cosmic consciousness plane), we are actually linking our own part of the noosphere (our 'personal soul") to other parts. As the noosphere has more diversity in it than human brains, it does of course appear as a "house with many mansions", and has many aspects of a collective dream, as in the novel "What Dreams May Come" by Matheson or many mystical writings;

(3) Our noosphere is not the result of local evolution on earth (as proposed by Teilhard de Chardin), but is one of a species of millions or billions or trillions of noospheres, which has evolved over billions of years in the vast ocean of dark matter connecting our galactic cluster. Of course, it is not a fully mature or integrated mind, and it is objectively at risk of dying in its entirety, as immature organisms often do in nature, despite all the best help they receive from their family and from their natural impulses to grow.

(4) As Besant [26] and Jung have noted, the noosphere has several types of modules in it, not only "personal souls,' but memories and archetypes which share this ecology with us, and ultimately draw emotional energy from the flow of 'psychic energy' of the noosphere as a whole. This is a flow of information, not a flow of physical energy, exactly as in the circuitry of the brain.

(5) Just as mundane human brains are a quantum level or two higher than the reptile in its level and type of consciousness, the noosphere is naturally at two levels above the sanest human brain, benefitting not only from a full exploitation of quantum effects but also from the symmetry which is expressed at times as "seeing through many eyes at once.' We can learn to channel these kinds of capabilities, at least for an hour or so each day in meditation, if we learn to tune more and more completely to the noosphere as a whole, the true meaning of "cosmic consciousness."

(6) Those mystics who claim to reach a level higher than cosmic consciousness are mostly engaged in wishful thinking and in ego bias – but even so, I deeply respect those native Americans who still revere "pachamama' (a symbolic representation of the noosphere) and "pachatta" ("pater galacticus," a deep reverence and appreciation for what we see in the starry sky beyond the earth).

(7) The more we develop higher consciousness, the more we are called to cope with more complexity in support of the growth and survival of the noosphere as a whole.

The path leads up to a state like the final states described in a classic novel by Lindsay [28] (not counting his allusion to a friend named Payne, which has caused some misunderstanding by religious Gnostics). Among the important challenges we need to address at a higher level of consciousness, simply in order to survive, are those described in www.werbos.com/IT_big_picture.pdf. Those who are enlightened enough to contribute to this conference all have essential roles to play, and new things to learn together, to make this possible.

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Talk 2:

The *Shillongator* Model of the Universe Revisited After 30 Years

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1. Introduction

In The Third International Seminar on the Living State held at the North-Eastern Hill University, Shillong, India, on December 13-19, 1986, ably organized by the then Vice-Chancellor, Professor Rajendra K. Mishra (1924-2009), two papers were presented, one by A. K. Mukhopadhyay of All India Institute of Medical Sciences, New Delhi, and the other by S. Ji of Rutgers University, Piscataway, USA. In the former, the concept of supracortical consciousness, i.e., the consciousness existing in the Universe beyond the human brain[1],was proposed and in the latter a biological model of the Universe later called the

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Shillongator was presented in which Life and Information were deemed to be the intrinsic aspects of our Universe [2], the two elements that are also present in the Supracortical Consciousness[3, 4].

The Shillongator(see **Figure 1**) postulates thatour Universe is a self-organizing physicochemical system driven by gnergy, the complementary union of information (gn-) and energy (-ergy). The discreet units of gnergy are referred to as gnergons [5,Section 2.3, pp. 24-50. PDF at http://www.conformon.net/wp-content/uploads/ 2012/08/Excerpts_ Chapters 2_ complementarity_ 08192012.pdf] which include conformons.

Conformonsare defined as the conformational strains located at sequence-specific sites within biopolymers (i.e., DNA, RNA, proteins) storing mechanical energy (due to conformational strains) and genetic information (due to the sequence specificity) that provide the driving forces for all goal-directed molecular processes in living cells [6].

Although Professor Mukhopadhyay saw the possible connection between the supracortical consciousness and the conformon in his book [1] already in 1987, I have been slow in recognizing this connection until now, probably because I have not yet read his book in entirety, except its abstract and review articles. In any case, I do now see more clearly (especially after reading Chopra's informative reviews on Mukhopadhyay's works [3, 4]) the connection between the supracortical consciousness and theShillongator (and hence between the supracortical consciousnessand gnergy/conformons).

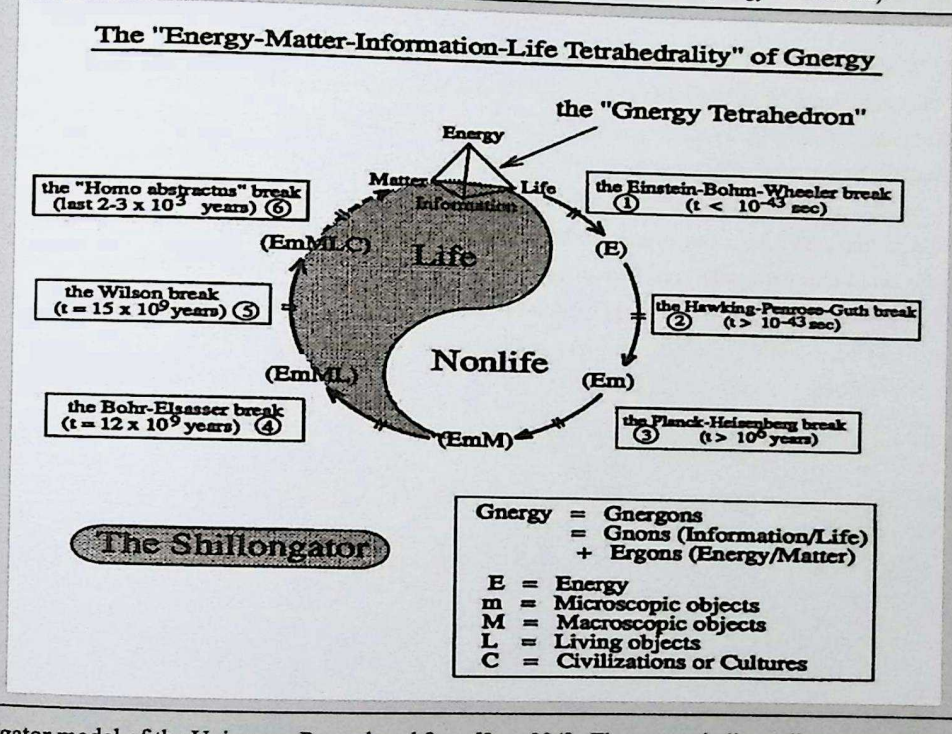

Figure 1. The Shillongator model of the Universe. Reproduced from [2, p. 234]. The arrows indicate discrete transitions called "break". More detailed explanations are given on pp. 233-237 in [2].

The conformon-supracortical consciousness connection is detailed in **Table 1** in [7] and summarizeddiagrammatically as shown in **Figure 2.** In this diagram, three aspects of Consciousness -- *Cosmological, Cortical,* and*Supracortical* – are recognized, each related to their associated languages (see Layer 3) and the metaphysical categories of Peirce (Section 4) (see Layer 5).**Figure 1** assumes that consciousness embodies ITR (Irreducible Triadic Relation) [7, Chapter 9] first articulated by the American chemist, logician and philosopher, Charles S. Peirce (1839-1914). ITR is depicted as a 3-node closed network which is equivalent to the commutative triangle in category theory [14, 15].

f g

1. **Cosmological Conscious.Cortical Conscious.Supracortical Conscious.**
2. **{Real Conscious.} {Lived Conscious.}{Theorized Conscious.}**
3. **(Cosmese) (Cellese) (Humanese)**
4. **<Object><Sign><Interpretant>**
5. **[Firstness] [Secondness] [Thirdness]**
6. **<| Physics |><| Biology |><| Philosophy |>**

h

Figure 2. The postulate that Consciousnessis irreducibly triadic [7; see Section 10.22].
f = Origin of life; g = origin of culture; h = grounding/embodiment/enlightenment. The commutative condition is thought to be satisfied, i.e., f x g = h, which reads "f followed by g leads to the same result as h". According to the cell language theory, both *cellese* and *humanese* are the

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complementary aspects of *cosmese* (see Figure 4.3 in [7], and Table 2.13 in [5, p. 44]). 1 & 2 = Consciousness studies [1]; 3 = cell language theory [7, 8]; 4 = Peircean semiotics [9-13], ; 5 = Peircean metaphysics [13]; 6 = Traditional disciplines, before the semiotics/ITR-induced paradigm shift in human knowledge/knowing [7].

2.The Principle of Self-Organization

The notion of self-organization is well known and widely accepted by contemporary scientists and philosophers. One of the originators of the field of self-organization, I. Prigogine (1917-2003), received the Nobel Prize in Chemistry in 1977 for establishing the concept of *dissipative structures(or "dissipatons" more briefly)*, the results of self-organization [16].

The phenomenon of spontaneous generation of the spatial patterns of chemical concentration gradients was first observed in a purely chemical system in 1958 [17, 18] and inside the living cell in 1985 [19]. These observations demonstrate that, under appropriate initial and boundary conditions, it is possible for chemical concentration gradients to *organize themselves* in space and time (e.g., oscillating chemical concentrations in a test tube), driven by the free energy released from the chemical reactions themselves. Such phenomena are referred to as *self-organization* and physicochemical systems exhibiting self-organization are called '*dissipative structures*' [17, 18]. All living systems, from cells to multicellular organisms, societies of organisms and the biosphere are dissipative structures or dissipatons.

The investigatorsin the field of self-organization, including Prigogine himself, apparently did not consider the antonym to self-organization, which I referred to as "other-organization" in 2012 [5, p. 17]. Self- and other-organizations (see **Table 1**) can be distinguished based on the source or the locus of the immediate energy andcontrol information serving as the necessary and sufficient conditions for organization (see **Table 2**). Thus, the Belousov-Zhabotinsky (BZ) reaction is self-organizing because the source of both the energy (chemical potential energy) and control information (encoded in the molecular shapes of the reactants and products) are internal to the system. In contrast, the Rayleigh-Bernard convection (RBC) patterns [20] are *other-organized* because the source of the energy maintaining the temperature gradient in the system is external to the system (**Tables 1** and **2**). Many view both BZ and RBC as examples of self-organizations which may be the result of conflating self-organization and other-organization [5, p. 17]. Another example: The flame of a candle is an instance of self-organization, but the image of the flame of a candle on a computer screen would be an instance of other-organization, "other" in this case being the computer engineers, software programmers, and electrical supply (**Table 1**).

Table 1. Examples of self- and other-organizations.

	Self-Organization	Other-Organization
1. Physics	the Big Bang	Rayleigh-Bernard convection cells
2.Chemistry	Belousov-Zhabotinskyreaction	Photochemical reactions
3. Biology	Natural trees	Artificial bonsai trees
4. Psychology	Natural behaviors	Forced behaviors
5. Engineering	Real flame of a candle	Flame of a candle on TV screen
6. Sociology	Free society	Dictatorial/totalitarian society
7. Philosophy	Objective thinking	Biased thinking
8. Religion	Self-enlightenment	Forced belief

Table 2. The difference between self-organization and other-organization.

	Source of	
	Energy	**Information**
Self-Organization	*System*	*System*
Other-Organization	*Environment*	*System*

Dissipative structures are material systems that exhibit non-random behaviors in space and/or time driven by irreversible processes. Living processes require both *equilibrium* and *dissipative structures*. Operationally we may define the *equilibrium structures* of living systems as

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those structures that remain, and *dissipative structures* as those that disappear, upon removing free energy input. Some *dissipative structures* can be generated from *equilibrium structures* through expenditure of free energy, as exemplified by an acorn and a cold candle, both *equilibrium structures*, turning into an oak and a flaming candle, *dissipative structures*, respectively, upon input of free energy:

Free Energy

Equilibrium Structures ----------> Dissipative Structures (1)

The flame of a candle is a prototypical example of dissipative structures. The pattern of colors characteristic of a candle flame reflects the space- and time-organized oxidation-reduction reactions of hydrocarbons constituting the candle that produce transient chemical intermediates, some of which emit photons as they undergo electronic transitions from excited states to ground states. From a mechanistic point of view, the flame of a candle can be viewed as high-temperature self-organizing *chemical reaction-diffusion systems* in contrast to the Belousov-Zhabotinskyreaction which is a low-temperature self-organizing *chemical reaction-diffusion system.*

The Bhopalator is a molecular model of the living cell constructed on the basis of the principle of self-organization as indicated by the suffix, "-ator". It is the common practice in physics and chemistry to name all self-organizing chemical reaction-diffusion systems as "X-ators", where X is the name of the city or the state associated with the research performed on the named system. The Bhopalatorwas first presented at the *Second International Seminar on the Living State* held in 1983 in Bhopal, India, and the first full-length paper on it was published in 1985 [24, 25, 26].The idea that cells are the structural and functional units of all living things was first proposed by the German biologist Theodor Schwann in 1839 and is known as the *cell theory*. ButSchwann's cell theory was devoid of any physical principles underlying cell structure and function. In contrast, theBhopalator model of the cell proposes a set of physical, chemical and semiotics (study of signs) principles that are deemed necessary to understand how the cell works on the molecular level.

Table 3 summarizes the self-organizing actions manifest at three distinct scales – chemical, biological,and cosmological.

Table 3. The free energy (ergon) and information (gnon) sources of gnergy driving self-organization.

	Source of	
	Free Energy (Ergon)	**Information** (Gnon)
1. **Belousov-Zhabotinsky Reaction**	Free energy-releasing chemical reactions	Initial conditions (chemical structures and concentrations of reactants, temperature, pressure, reaction volume, shape of reaction vessels, etc.)
2.**Living Cell**	Free energy-releasing chemical reactions	DNA, cytoplasmic elements
3. **Universe**	Big Bang energy	Primeval Information (e.g., Superstring)

3. Semiotics

Semiotics, the study of signs, can be traced back to the beginning of the human history (e.g., farmers seeing clouds as the signs of rain), but the investigation of signs as a fundamental science did not begin until the Portuguese monk John Poinsot (1589-1644) and C. S. Peirce (1839-1914) (apparently independently of Poinsot) undertook their comprehensive and systematic studies of signs [27]. Peirce defined a sign as follows:

"A *sign*, . . . , is *something* which stands to *somebody* for *something* in somerespect or *capacity*." (2)

Peirce recognized three major classes of signs –

1) *Iconic signs* (e.g., portraits, diagrams, tables),
2) *Indexical signs* (e.g., smoke as a sign of fire, a finger pointing to an apple), and
3) *Symbolic signs* (e.g., words, sentences, texts).

This division of signs is based on Peirce's realization that *signs* (also called sign vehicles or representamens) exhibit three distinct relations with respect to their *object* (or referents) -- *iconic, indexical,* and *symbolic* relations. This fact is often interpreted by many as there being three "kinds" of signs, namely, "iconic signs", "indexical signs", and "symbolic signs", but the term "kinds" of signs can be misleading if one takes them to mean separate and independent entities. A more accurate statement is that "there are three aspects to a sign", so that a sign can exhibit

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one or more of these three aspects, depending on the context of discourse. I cite below three authors, including Peirce himself, whose quotations support such an interpretation:

C. S. Peirce cited in [28]:

(Each of the above three aspects) ". . . serves to bring before the mind objects of a different kind than those revealed by the other species of signs. . . . the most perfect of signs are those in which the iconic, indicative [or indexical], and symbolic characters are blended as equally as possible". (2)

M. H. Fisch [29, 30]:

". . . there are no absolutely pure symbols, indexes, or icons, but that these are elements or aspects that vary greatly in their relative prominence from sign to sign." (3)

V. M. Colapietro [28]:

". . . the relation of sign to object may be based on a possible resemblance, an actual reaction, or a habitual connection. Insofar as a sign is related to its object by virtue of a possible resemblance, it functions *iconically*; insofar as this relationship depends on an actual reaction or set of such reactions, it functions *indexically;* and insofar as this relationship results from a habitual connection it functions *symbolically*. The fact that a sign functions in one of these ways does not preclude it from functioning in one or both of the other ways; in fact, the most perfect signs function in all three of these ways." (4)

Three corollaries may be drawn from the *icon/index/symbol triadicity* of Peircean signs:

1) Even linguistic marks such as English or Chinese words and sentences, possess, in addition to symbolic functions, their iconic and indexical functions.
2) Molecular signs such as hormones, RNA and DNA segments possess symbolic functions in addition to their iconic (e.g., structural complementarity between hormones and their receptors) and indexical functions (e.g, free energy of binding interactions between DNA and DNA-binding proteins during gene expression).
3) Elementary particles of physics may be regarded as Peircean signs with iconic and indexical functions predominating and their symbolic function suppressed, waiting to be reified or instantiated when a right set of environmental conditions present themselves.

Finally, it should be pointed out that the triadic definition of a sign given by Peirce and that of a mathematical category are related or even equivalent, and that some mathematicians and theoretical physicists believe that physics and mathematics can be unified under the framework of the category theory [31, 32], which is not too surprising because both physics and mathematics depend on the use of specialized signs.

4. Peircean Categories: Firstness, Secodness and Thirdness

Peirce maintained that everything or every phenomenon in the Universe comprises three basic "irreducible" categories or elements called *Firstness*, *Secondness*, and *Thirdness*. One way to get a feel for these *categories* is through some of the examples that Peirce gave of these categories throughout his career. These are collected in **Table 4**, which was adopted from [33]. It is evident that the examples are not logically rigorous (indeed they are "vague" and even contradictory in some cases), having some overlaps here and there and missing some examples. Nevertheless, it is possible to recognize (i) the unmistakable family resemblances among most of the items listed within each category or within each column, and (ii) distinct family characteristics are present among the three categories or within each row.

Table 4. The evolution of Peirce's definitions of categories. Reproduced from [33] except items #8 and #9.

Year (*Peirce's age*)	**Firstness**	**Secondness**	**Thirdness**
1867 (*28*)	1. quality	relation	Representation
1891 (*52*)	2. first	second	Third
	3. spontaneity	dependence	Mediation

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	4. mind	matter	Evolution
	5. chance	law	tendency to take habits
	6. sporting	heredity	fixation of character
	7. feeling	reaction	Mediation
1894 (*55*)	8.		Learning
	9.		Government
1896 (*57*)	10. quality	fact	Law
1897 (*58*)	11. ideas of feelings	acts of reaction	Habits
	12. quality	shock/vividness	
	13. feeling	reaction	Thought
1898 (*59*)	14. quality	reaction	Mediation
	15. first qualities/ ideas	existence/ reaction	potential/continuity

5.Macrosemiotics vs. Microsemiotics

Peirce did not have access to the empirical evidence that came to light only in the mid-20th century, i.e., the evidence that semiotic processes are not confined to the macroscopic human world but also occur on the molecular level [34-44]. Despite the huge difference in size of the sign processors involved (see **Table 5**below), it is amazing to find that there appears to be a set of principles that is common to the semiotic processes on both the human linguistic and the molecular biological levels [8,34-38].

Table 5. A comparison between the physical dimensions of the *macroscopic* and *microscopic* sign processors. Notice that the linear dimension of the human body is about five orders of magnitude greater than that of the cell. Adapted from [37].

Parameters	**Human Body**	**Cell**
1. *Size* *Linear size (m)* *Volume (m^3)*	Macroscopic ~ 1 ~ 1	Microscopic ~ 10^{-5} ~ 10^{-15}
2. *Number of cells involved*	~10^{13}	1
3. *Signs used for communication* *Linear size (m)* *Volume (m^3)*	Words & sentences ~10^{-3} ~10^{-9}	Molecules ~ 10^{-8} ~10^{-24}
4. *Mechanics obeyed*	Classical	Classical and quantum
5. *Thermally stable at ~25° C*	Yes (i.e., rigid)	No (i.e., deformable)
6. *Powered (or driven) by*	Chemical reactions	Chemical reactions

6. Peircean Signs as Gnergons

Peirce explains how signs can be divided into a total of nine classes [45]:

"*Signs are divisible by three trichotomies; first, according to as the sign itself is a mere quality ('qualisign'; my addition), is an actual existent ('sinsign'), or is a general law ('legisign'); secondly, according as the relation of the sign to its object consists in the sign's having some character in itself ('icon'),* (5)

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or in some existential relation to the object ('index'), or in its relation to an interpretant ('symbol'); thirdly, according as its interpretant represents it as a sign of possibility ('rheme') or as a sign of fact ('dicent sign') or a sign of reason ('argument')."

The above classification of signs by Peirce is summarized in **Table 6.**

Table 6. The classification of signs according to the ontological/material trichotomy (first row) and the phenomenological/formal trichotomy (first column). Adopted from [98].

	Firstness (*Potentiality*)	**Secondness** (*Facts,Actuality*)	**Thirdness** (*Law, Habits*)
Firstness (*Sign*)	Qualisign	Sinsign	Legisign
Secondness (*Object*)	Icon	Index	Symbol
Thirdness (*Interpretan t*)	Rheme	Dicent Sign (or Dicisign)	Reason (or Argument)

There are a total of nine types of signs in **Table 6.** I suggest the following ideas for the possible connection between Peircean signs and the concept of the complementarity proposed by Niels Bohr (as generalized in 1995 [46]):

1) Each of the nine types of signs appearing in **Table 6** has a dual aspect (reminiscent of the wave/particle duality of light) -- the *ontological* (or *material*) and the *phenomenological* (or *formal*) aspects.

2) The ontological/material aspect of a sign can be identified with energy/matter properties, while the phenomenological/formal aspect with informational properties.

3) Therefore, Peircean signs given in **Table 6** can be viewed as examples of what I called "gnergons" in 1991 [2], defined as discrete units of gnergy, the complementary union of energy ('ergons') and information ('gnons') that is postulated to be the ultimate cause of, or ground for, all self-organizing (or pattern-forming) processes in the Universe (see **Figure 1**).

4) Since all sign processes (i.e., *semiosis*) can be viewed as species of self-organizing processes, ultimately driven by the free energy of exergonic chemical reactions (e.g., ATP hydrolysis or oxidation of NADH) or physical processes (e.g., solar radiation, the Big Bang, etc.), it would follow that gnergons are the ultimate causes (or drivers) of semiosis [46].

5) According to complementarism [46], a scientific metaphysics rooted in both contemporary biology and Bohr's philosophy of complementarity [47], the ultimate reality is a complementary union of *information* and *energy*, i.e., *gnergy*, a new term formed by combining "gn-" from gnosis (meaning knowledge) and "-ergy" from ergon (meaning work or energy), the discrete units of gnergybeing referred to as "gnergons". Since signs are examples of gnergons, it may be concluded that Peirce's semiotics falls within the domain of the application of complementarism. This claim may be supported by the following arguments:

(a) Peirce's semiotics deals mainly with macroscopic signs, i.e., signs with macroscopic dimensions "perfusing" the Universe. The birth of molecular biology was about four decades away when Peirce died in 1914 [48].

(b) Complementarism can be applied not only to Peirce's semiotics (as suggested above) but also to molecular and cell biology, as evident in the formulation of theory of "microsemiotics" based on the gnergy concept [37, 38]. Microsemiotics can be regarded as synonymous with the twin theories of the living cell known as *biocybernetics* and *cell language theory* [38] as indicated by Eq. (6). It is also possible to refer to the combination of biocybernetics and cell language theory as 'molecular information theory' [49]. In other words, 'microsemiotics' and 'molecular information theory' are synonymous.

(c) Thus the following relations suggest themselves, i.e., Eqs. (6) through (9):

Complementarism = Macrosemiotics + Microsemiotics (6)
= Peirce's semiotics + Biocybernetics/Cell Language
= Peirce's semiotics + Molecular Information Theory

Consistent with Peirce's triadic ontology, the principle of *complementarity* itself may be manifested in the Universe in three distinct modes:

Firstness = Complementarity in metaphysics (e.g., Yin and Yang as complementary aspects of the Dao of Lao-tzu [50]; Extension and Thought as complementary aspect of Substance of Spinoza [51]; (7)

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Body and Mind as complementary aspects of Flesh of Merleau-Ponty [52])

Secondness = Complementarity in physics (e.g., the wave/particle duality of light) (8)

Thirdness = Complementarity in psychology (e.g., hysterical anesthesia of William James [53]), physiology (i.e., the left/right hemispheric specialization [54]), and molecular and cell biology (e.g., the *information/energy complementarity* of *gnergy* [46]) (9)

7. The Quark Model of the Peircean Sign [55]

There is a striking family resemblance between particle physics and Peircean semiotics. There are at least 11 instances in physics where the number 3 plays an essential role as in Peircean semiotics, as pointed out by Christiansen [56]:

(1) 3 generations of elementary particles -- quarks (2nd row in **Table 7**) and leptons (3rd row). The electric charges of the elementary particles are given on the left-hand side of the first column, which applies to the second and the third columns as well. The mass of each quark is given in the angled brackets in the unit of 10^6 electron Volts. The mass of the elementary particles belonging to each generation increases in the order $1 < 2 < 3$, which reflects the order of discovery: The accelerators measuring light particles were developed before those able to detect heavier ones.

(2) Heavy nuclear particles, or baryons, consist of 3 quarks.

(3) Quarks have 3 colors -- red, green, and blue.

(4) Quarks have strange electric charges, each being 1/3 of the electron's charge, e.

(5) Particles have 3 internal properties -- spin, mass, and charge.

(6) Particles undergo 3 kinds of interactions -- strong, electroweak, and gravitational.

(7) Strong interactions are mediated by $2^3 = 8$ gluons.

(8) Quarks and leptons interact weakly mediated by 3 intermediate vector-bosons.

(9) Space has 3 dimensions.

(10) There are 3 types of units - length, mass, and time.

(11) There are *3 fundamental constants* of nature – the Planck constant (h), the speed of light (c), and the gravitational constant (G).

Table 7. 3 generations of elementary particles.

Generation 1	**Generation 2**	**Generation 3**
+2/3e: up (u) [5] -1/3e: down (d) [9]	charm (c) [350] strange (s) [160]	top (t) [>80] bottom (b) [4800]
-1e: electron 0: electron neutrino	muon muon neutrino	tauon tauon neutrino

In addition, the number three appears in the following contexts:

1) The smallest unit of all networks or mathematical categories comprises three elements – the *initial* and *final nodes* and the *arrow* connecting them [31].
2) The probability theory of Kolmogorov comprises *three and only three* axioms; (1) $0 < p < 1$, (2) $p + p' = 1$, where p' is the complement of p, and (3) $p(A+B) = p(A) + p(B)$.
3) Most of chemistry and biology can be accounted for in terms of the interactions among *3 particles -- photons, electrons,* and *protons.*
4) There are only *three major classes of polymers* in living systems – nucleic acids, proteins, and carbohydrates.
5) The human brain is constructed out of the *three main functional structures* – the right and left hemispheres, and the corpus callosum [54].

These examples strongly support the notion that there is something fundamental about the number 3 in particle physics and semiotics as well as in other fields, perhaps because all material entities and processes in the Universe (including the human brain) are derived from gnergy, defined as the complementary union of *information* and *energy* and the concept of *complementarity* itself being triadic (consisting of *gnergy, mattergy* and *liformation* [5, Figure 12.4 on p. 640].

Peirce defined 9 *types* of signs (see **Tables 8,** which repeats **Table 6** with some added information) and 10 *classes* of signs (see **Table 9**) based on these 9 types [45]. For convenience, I will refer to the former as e-signs ("e" standing for "elementary") and the latter as c-signs ("c"

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standing for "compound" or "composite"). But it is not clear to me how Peirce derived the 10 classes of what are here called c-signs from the 9 types of e-signs. Sheriffprovides a clear rationale for deriving 9 types of signs in [45]. Before quoting Sheriff, the following preliminary information is provided to facilitate understanding what Sheriff has to say:

1) According to the metaphysics of Peirce, there are three and only three modes of being in the Universe, *Firstness, Secondness*, and *Thirdness*(see **Section 4**) [57, pp. 75-76].

2) The term "sign" is used in two ways -- as a triadic entity, i.e., as "representamen-object-interpretant", or as a monadic one, i.e., as "representamen". Representamen is also called "sign vehicle", and "interpretant" is the effect a sign has on the mind of the interpreter.

3) Peircean "trichotomies" (i.e., the action or results of cutting something into three) refer to the following three sets of three terms (see **Table 8**):

i) qualisign, sinsign, legisign(Firstnesstrichotomy, to borrow the idiom of some semioticians)
ii) icon, index, symbol (Secondnesstrichotomy)
iii) rheme, dicent sign, argument (Thirdnesstrichotomy)

The following quote from Sheriff [45] succinctly describes how Peirce arrived at his 9 types of signs (see also Statement (4)):

"We have already defined Firstness, Secondness, and Thirdness as ontological modes of being (possibility, fact, and law) and as experienced in consciousness (feeling, reaction-sensation, and general conception). When Peirce analyzed his definition of a sign (as representamen-object-interpretant) in relation to each of these categories, he concluded that a sign or representamen is one of three kinds (Qualisign, Sinsign, or Legisign); it relates to its object in one of three ways (as Icon, Index, or Symbol); and it has an interpretant that represents the sign as a sign of possibility, fact, or reason, i.e., as Rheme, Dicent Sign, or Argument. These three sets of three terms are the 'trichotomies' in Peirce's semiotic. The strange words in this paragraph have evoked much confusion and disgust and have been obstacles to the influence of Peirce's thought. But if we keep the following in mind, these terms become quickly understandable: the first term in each trichotomy describes the Firstness of the sign, object, and interpretant; the second term in each trichotomy describes the Secondness of the sign, object, and interpretant; and the third term in each trichotomy describes the Thirdness of a sign, object, and interpretant."

The content of the above paragraph is summarized in **Table 8**, which shows the formal (see the left-most column) and ontological (the upper-most row) characters of e-sings. This table also shows a new system of notation for e-signs.

Table 8. The 9 types of signs (e-signs) revisited.

	Firstness (1) *(Quality, Possibility)*	**Secondness (2)** *(Actuality, Reaction)*	**Thirdness (3)** *(Law, Habit, Representation)*
Firstness (1) (Representamen)	Qualisign ($S_{1,1}$)	Sinsign ($S_{1,2}$)	Legisign ($S_{1,3}$)
Secondness (2) (Object)	Icon ($S_{2,1}$)	Index ($S_{2,2}$)	Symbol ($S_{2,3}$)
Thirdness (3) (Interpretant)	Rheme ($S_{3,1}$)	Dicent sign ($S_{3,2}$)	Argument ($S_{3,3}$)

Each of the 9 signs in **Figure 8** can be represented as $S_{i,j}$, where S indicates 'sign', the first running index i refers to the *formal category* (i.e., the rows), and the second running index j refers to the ontological category (i.e., the columns). Both *i*and *j*run from 1 to 3. For example, $S_{1,3}$ denotes Legisign, and $S_{2,1}$ refers to Icon, etc. The traditional names of the e-signs are given above the systematic names.

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According to Peirce, an *embodied sign* is composed of 3 elementary signs. That is,

c-Sign = 3 e-Signs (10)

Unlike baryons which are unordered sets of 3 quarks, c-signs are ordered (and hence 'informed') sets of three e-signs:

c-Sign = $\{(S_{3,j}), (S_{2,j}), (S_{1,j})\}$ (11)

The 10 classes of signs defined by Peirce in the form of Eq. (11) are listed in **Table 9**.

Table 9. The 10 classes of c-signs. The new code for each class is given below the traditional designation.

Class	Compound Sign (c-Sign)	Example
First	Rheme-icon-qualisign $(S_{3,1})$-$(S_{2,1})$-$(S_{1,1})$ or $S_{1,1,1}$	Feeling of red
Second	Rheme-icon-sinsign $(S_{3,1})$-$(S_{2,1})$-$(S_{1,2})$ or $S_{1,1,2}$	An individual diagram
Third	Rheme-index-sinsign $(S_{3,1})$-$(S_{2,2})$-$(S_{1,2})$ or $S_{1,2,2}$	A spontaneous cry
Fourth	Dicent sign-index-sinsign $(S_{3,2})$-$(S_{2,2})$-$(S_{1,2})$ or $S_{2,2,2}$	Pointer position of a meter
Fifth	Rheme-icon-legisign $(S_{3,1})$-$(S_{2,1})$-$(S_{1,3})$ or $S_{1,1,3}$	Circuit diagram Computer icon
Sixth	Rheme-index-legisign $(S_{3,1})$-$(S_{2,2})$-$(S_{1,3})$ or $S_{1,2,3}$	A demonstrative pronoun
Seventh	Dicent sign-index-legisign $(S_{3,2})$-$(S_{2,2})$-$(S_{1,3})$ or $S_{2,2,3}$	A street vendor's cry
Eighth	Rheme-symbol-legisign $(S_{3,1})$-$(S_{2,3})$-$(S_{1,3})$ or $S_{1,3,3}$	A common noun
Ninth	Dicent sign-symbol-legisign $(S_{3,2})$-$(S_{2,3})$-$(S_{1,3})$ or $S_{2,2,3}$	A proposition
Tenth	Argument-symbol-legisign $(S_{3,3})$-$(S_{2,3})$-$(S_{1,3})$ or $S_{3,3,3}$	Inference (abduction, induction, deduction)

Two features of the 10 c-signs given in **Table 9** are noteworthy:

1) The epistemological categories (i.e., the i values) of the e-signs in a c-sign decreases as 3, 2, and 1 in conformity with Statement (12).
2) The ontological categories (i.e., the j values) of the 3 e-signs constituting a c-sign obey the following rules:

"*The j value of* $(S_{1,j})$ *cannot be lower than the j value of* $(S_{2,j})$, *which in turn cannot be lower than the j value of* $(S_{3,j})$." (12)

Alternatively, since a c-sign can be represented as $S_{i,j,k}$, with 3 sub-indexes, i, j, k, each representing interpretant, object, or representamen (see **Table 8**), all of the 10 c-signs in **Table 9** can be represented more simply as $S_{i,j,k}$ with the sub-indexes obeying the following rule:

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$i \leq j \leq k$ (13)

where the symbol "≤" reads "less than or equal to" or "not greater than". The rules given in (12) and (13) , which are equivalent, will be referred to as the "Peircean selection rule" (PSR).

To the best of my knowledge, Peirce did not provide any justification as to why three (and not some other numbers) of e-signs constitute a c-sign. This gap may be filled by the postulated 'isomorphism' between *quarks* and *e-signs* as explained in **Table 10**.

Table 10. The family resemblance (to be called the "isomorphism" loosely) between *elementary particles* and *Peirce's elementary signs* or *e-signs*

Parameters	**Particle Physics**	**Semiotics**
Elementary Units	6 quarks (u, d, c, s, t, b) 6 leptons	9 e-signs (or sign types): $(S_{1,1})$, $(S_{1,2})$, $(S_{1,3})$, $(S_{2,1})$, $(S_{2,2})$, $(S_{2,3})$, $(S_{3,1})$, $(S_{3,2})$, $(S_{3,3})$ (see **Table 6.6**)
Compound Units	~ 60 baryons	10 classes of c-signs (or embodied signs) (see **Table 6.7**)
Syntactic Rules	3 quarks in a baryon	3 e-signs in a c-sign
Order Parameters	mass (5 - 5,000 MeV) electric charge (+2/3, -1/3) color charge (r, g, b)	1) The *epistemic* categories of e-signs are denoted by their first subindexes 1, 2, & 3. 2) The *ontological* categories of e-signs are denoted by their second subindexes 1, 2, & 3.
Semantic Constraints	3 quarks in a baryon must color white.	1) The *epistemic* categories of the 3 e-signs constituting a c-sign must increase from right to left ("the right-to-left parity") 2) The *ontological* categories of the 3 e-signs constituting a c-sign must obey the "Peircean selection rule" given in (6.8) or (6.9) above.

If the "isomorphism" between elementary particles and Peircean*elementary*signs is real as claimed in **Table 10**, we can make the following predictions:

1) Just as baryons form atoms in interaction with electrons, so may c-signs form higher-order signs in interaction with the electron analogs of semiotics, which may well turn out to be the *sign processor*, leading to a tetrahedron (the usual triangle with an extra node above it) as a geometric representation. This sign tetrahedron (in contrast to the traditional sign triad) may be called the "atomic signs."
2) Atoms form molecules through covalent (or strong) bonds. Similarly, "atomic signs" may form "molecular signs" through "strong bonds".
3) Just as molecules form molecular complexes (e.g., enzyme-substrate complexes) through weak non-covalent bonds, so "molecular signs" may interact through weak bonds to form "sign complexes". The "semions" proposed by R. R. Gudwin [293] may be viewed as an example of "sign complexes" defined here.
4) Inside the living cell, molecular complexes interact selectively forming dynamic networks of molecular complexes. Likewise, "sign complexes" may interact selectively in space and time to form dynamic "sign networks" realizing or executing some complex tasks, similar to the "semionic networks" of Gudwin [58].

As already alluded to, the triadic structure of Peircean*composite* signs can be denoted as S_{ijk}, where S indicates "sign", and the subscripts i, j and k indicate, respectively, *interpretant*, *object*, and *representamen*.Representamen is often replaced by (or used synonymously with) "sign" so that the term "sign" has dual meanings --"elementary sign" and "composite sign", which can cause confusions unless due care is exercised. Semioticians not distinguishing between these two types of signs would be akin to physicists conflating *quarks* and *baryons*.

Since each of the three subscripts can assume any one of the three possible numerical values -- i as one of the three values in the third row in **Figure 8**, j one of the three values in the second row, and k one of the three values in the first row -- there can be in principle $3x3x3 = 27$

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possible composite signs. However Pierce chose only 10 out of these possibilities apparently based on what is referred to as the *Peircean selection rule*, Inequality (13), given above.

8.The derivation of 'Nilsign' or 'Signless' and its associated category called 'Zeroness' based on the quark model of the Peircean sign.

According to Sheriff [45],

Legisign is "a sign which would lose the character which renders it a sign if there were no interpretant." (14)

Sinsign is "a sign which would, at once, lose the character which makes it a sign if its object were removed, but would not lose that character if there were no interpretant." (15)

Qualisign "can only be an icon." (16)

It is based on Statement (15) that I regard *sinsign* as 'interpretant-less sign', meaning that it can be a sign without its interpretant. We can represent this idea algebraically thus:

$$S_{i,j,k} \xrightarrow{i=0} S_{j,k} = \text{Sinsign} \quad (17)$$

Process (17) can be read as

"A sinsign is the sign that results when there is no interpretant, i.e., when i = 0." (18)

It is based on Statement (16) that I regard qualisign as 'object-less sign', meaning that it can be a sign without its object. We can represent this idea algebraically as

$$S_{i,j,k} \xrightarrow{j=0} S_k = \text{Qualisign} \quad (19)$$

Since $i \leq j$ according to the Peircean selection rule, Inequality(13), when j = 0, i must necessarily be zero and hence both sub-indexes i and j drop out, leaving behind the sub-index k only.

Process (19) can be read as

"A qualisign is the sign that results when there is no object, i.e., when j = 0." (20)

Since there are "interpretant-less sign", (17), and "object-less sign", (19), I am assuming that there can be "reprentamen-less sign" based on the principle of synechism [59] and I propose "nilsign' or 'sign-less' as the name of the "representamen-less sign":

$$S_{i,j,k} \xrightarrow{k=0} S = \text{'Nilsign' or 'Sign-less'} \quad (21)$$

Process (21) can be read as

"A nilsign is the sign that results when there is no representamen, i.e., when k = 0." (22)

And the new category to which 'nilsign' belongs, I elected to call 'Zeroness" [7, Section 6.6.4], leading to **Table 11.**

Table 11. Zeroness as the new category invoked to accommodate 'nilsign' predicted by the quark model of the Peircean sign.

Category	'Zeroness'	Firstness	Secondness	Thirdness
Characteristics	Transcendentality	Quality	Fact	Habit

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	Ineffability	Potentialtiy	Actuality	Laws
Sign	*'Nilsign' or 'Signless'*	*Qualisign*	*Sinsign*	*Legisign*

In September, 2016, S. Brier brought to my attention the following paragraph from one of his papers [60] wherein Peirce describes the concept of *Pure Zero* which seems almost identical with that of Zeroness developed above:

"If we are to proceed in a logical and scientific manner, we must, in order to account for the whole universe, suppose an initial condition in which the whole universe was non-existent, and therefore a state of absolute nothing. . . . We start, then, with nothing, pure zero. But this is not the nothing of negation. For not means other than, and other is merely a synonym of the ordinal numeral second. As such it implies a first; while ***the present pure zero is prior to even first.*** *The nothing of negation is the nothing of death, which comes second to, or after, everything. But this pure zero is the nothing of not having been born. There is no individual thing, no compulsion outward nor inward, no law.* ***It is the germinal nothing, in which the whole universe is involved or foreshadowed.*** *As such, it is absolutely undefined and unlimited possibility - boundless possibility. There is no compulsion and no law. It is boundless freedom."* [61](Highlight is mine.) (23)

As evident, Peirce already thought about what I call Zeroness in his concept of Pure Zero, but he apparently did not consider *naming*his Pure Zero as I have done with the name, 'Signless' or 'Nilsign' (**Table 11**), that can be logically associated with Zeroness based on the quark model of the Peircean sign. It would be an interesting challenge for interested semioticians to find out whether or not Peirce discussed any ideas similar or related to 'Nilsign' or 'Signless' in his extensive writings in connection with his concept of Pure Zero.

9. The *Neo-Semioitcs* and the Possible meaning of Zeroness

The version of the Peircean semiotics that is extended to encompass *Zeroness* and its associated *Nilsign*or *Signless*as described in **Section 8**may be referred to as the *neo-semiotics.*

The Zeroness embodied in the neo-semiotics appears to belong to the Z World in the model of the Universe called *Seoulator*depicted in **Figure 5**. The Seoulator was proposed in Seoul in 1995as a metaphysical model of the Universe in contrast to the Shillongator which is a physical model of the Universe [62].**Figure 5**was updated on September 24, 2016, by adding the **Zeronessas** a part of the *Invisible World* to reflect the **Zeroness** discussed in **Section 8**, the **Pure Zero** of C. S. Peirce [60], the **Zero** of P. Rowlands who derived fundamental equations in physics based on the mathematics of zero [63], and the **Zero** of L. Krauss who marshaled recent astrophysical evidence that the Universe arose from zero [64]. In June, 2017, the Supracortical Consciousness of Mukhopadhyay was also added to the Z World. When I chose the letter **Z** in 1995 [46] to represent the Invisible World, I did not anticipate that, two decades later, in 2016, it would be assigned the role of representing so many different kinds of Zeros in natural and human sciences, all of which may be viewed as the *tokens* of the *type*, Z.

10. Conclusions

The concept of Life was forced to be introduced into the Shillongator model of the Universe by the logic of complementarity in 1991 [2, 5]. To account for the phenomenon of oxidative phosphorylation (oxphos) in mitochondria, the power house of the cell, it was postulated by D. E. Green and S. Ji in 1972 [7; see Section 3.3] that enzyme catalysis is driven by *conformons*, the conformational strains of biopolymers that carry both mechanical *energy* and genetic *information* necessary and sufficientto drive all goal-directed molecular processes in the living cell, including oxphos. They further postulated that the relation between *energy* and *information* constituting conformons was complementary, similar to the relation between waves and particles in quantum mechanics. The complementary union of *information* and *energy* was named *gnergy* which was geometrically represented as a triangle, with *gnergy*occupying the apex and *energy* and *information*occupying the lower two corners. Since energy and matter are supplementarily related through Einstein's $E = mc^2$, it was thought to be more logical to replace *energy* with *matter-energy* or *mattergy* in the gnergy triangle. This in turn forced us to considerdichotomizing the information corner of the gnergy triangle, and this is where it was thought most logical to pair *information* with *life*, just as *energy* is paired with *matter*, leading to the concept of *life-information* or "liformation" more briefly in analogy to *mattergy*. Thus, Life was logically (based on the principle of the information-energy complementarity) introduced in to the Shillongator model of the Universe. Since Life is undoubtedly connected with or related to Consciousness, it may be concluded that Consciousness is also an intrinsic aspect the Shillongator. It also seems reasonable to speculate that there are two categories of consciousnesses – the Visible and the Invisible (see **Figure 5**). The Invisible Consciousness that emerges in connection with the Shillongator may be related to or identified with the Supracortical Consciousness of Mukhopadhyay as indicated in Figure

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5. Finally, the recent development of the concept of Zeroness in [7] which was arrived at logically via the quark model of the Peircean sign seems to further support the notion of Supracortical Consciousness and the Life in the Invisible World actng as the source of the Visible World.

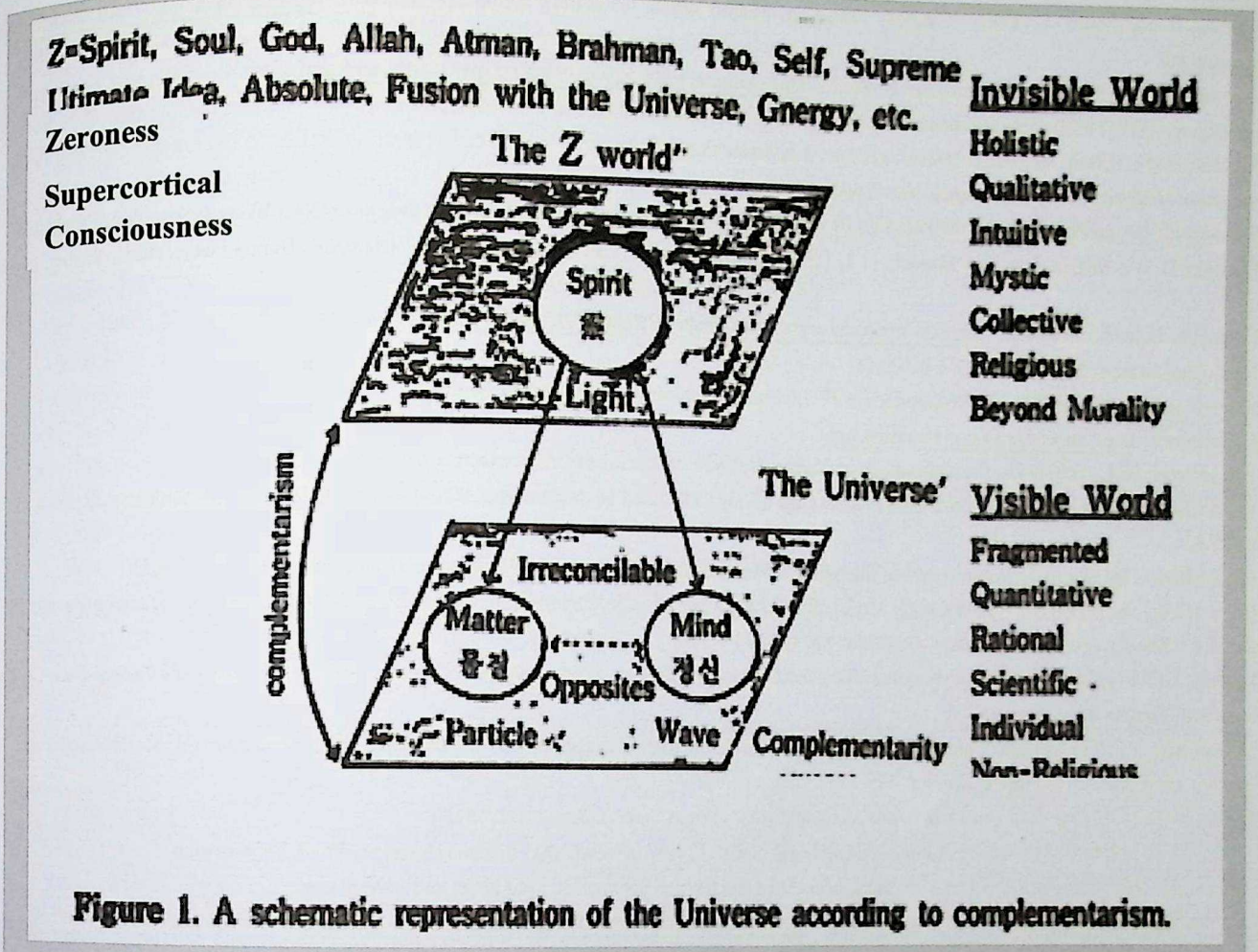

Figure 5. *The Seoulator*. The model of the cosmos and the ultimate reality that is based on the principles of complementarity and self-organization and includes *Spirituality* as an intrinsic aspect of reality [62]. *The Shillongator* shown in **Figure 1** can be viewed as a physical model of the Universe in contrast to *the Seoulator* which is a metaphysical model. This figure, first published in 1995 [46], was updated by adding the symbol "Zeroness" [7, Chapter 10] in the Z World in September, 2016, in order to make it compatible with **Table 11**, and "SupercorticalConsciusness" [1]in June, 2017.

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Talk 3:

Life Comes from Life and Matter Comes from Life – Consistency with Modern Science

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Abstract
Having solved the mind-body problem, Vedanta states that "life comes from life" and "matter comes from life". Vedanta asserts that consciousness does not arise from any physical basis, biological or otherwise. In this presentation, we explain that the above statements are consistent with modern science in spite of some scientists believingthat biological matter in living beings creates consciousness, and some computer scientists insisting that it is only a matter of days before they can make conscious computers.
Keywords: Vedanta, Hard problem, Subjective experience, Life comes from life, Matter, Information

1. Introduction

Consciousness, body,mind, and their relations to one another were thoroughly analyzed by Vedanta, the Indian philosophy of ancient times. [1]Having already solved 'mind-body problem' Vedantahas answers to many difficult philosophical questions posed by today's scientific researchers of consciousness.Today's scientific theories implicitly assume that matter is real and every phenomenon in the universe is a phenomenon only of matter. (This position is called material realism.) Instead, to explain proximity in space, succession of time, and cause-effect relations observed in nature, Vedanta postulates that an all-pervading, ever-existing, blissful, merciful, free willed consciousness exists as the unchanging ground of all creation and that it is the source, sustainer, absorber, and ruler of all bodies, minds, and beings in the universe.This Universal Consciousness is said to manifest Itself by Its own will, as all the various beings in the universe and to be present in the hearts of all living beings as the Self (Atma). Moreover, Consciousness is said to be beyond space, time, senses, logic, and mind and therefore Its existence cannot be predicted by any scientific theory, nor can Consciousness be detected by scientific experiments (Kenopanishad). Hereafter, It is denoted by

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Consciousness with a big C in front, to distinguish It from the fragmented consciousness of living beings which exists only in wakeful and dreaming states and knows only one thing at a time; one individual does not know the conscious experience of another whereas Consciousness knows everything everywhere all the time!

What is consciousness? Why does a lifeless physical system never exhibit consciousness whereas human beings (and other living beings) do? Can we explain subjective experience in objective (scientific) terms? These are some of the questions being debated bymodern researchers of consciousness coming from both scientific and social disciplines and philosophies. Among the various questions, which scientific researchers come across as theyinvestigateconsciousness-related phenomena such as subjective experience, attention, executive control of action (free will), and sense of self, Chalmers (1996) thinks that experience is central to consciousness and argues that the really "hard problem" of consciousness is to explain how conscious experience arises from a physical basis, namely, the living biological matter. In this article, we give a brief summary of Vedanta's solution to the 'hard problem', which states thatconsciousness DOES NOT arise from biological matter but only 'appears' in living matter and explains why it is not manifest in lifeless matter. We also explain how two associated Vedantic views: that "life comes from life" and "matter comes from life" (Bhakti Niskama Shanta 2015) are consistent with neuroscienceandquantum physics, contrary to some scientists' belief that biological matter in living beings creates consciousness.

2. Matter and Information

We will start of our discussion by looking into what we mean by 'matter' and 'information', and what their difference is.

Definitions:

Hereafter, for brevity, we will use the word 'physical' to mean 'accessible to, or observable directly by senses'. 'Matter' is what can be perceived via senses directly or indirectly via physical instruments.

According to the above definition, time is unphysical because time is not accessible to senses. Time in Special Relativity is what a physical clock shows and it goes by the name 'physical time'!

Real information (RI), the content of a conscious experience: In our lives, we have many conscious experiences. In any such experience,we are aware of something, which may be an emotion, a desire, a thought etc., or aware of seeing, hearing, touching, tasting, or smelling an external object accessed by one's senses. We may call this something information. There seems to be a subject, which we report as 'I' and there is ability to be aware/conscious, which seems to be available when we are awake but not in deep sleep; in dream sleep, there is ability to be aware of some imaginations but not of the sensory contacts with the outside world. Hence a conscious experience has three components to it: 1) the 'I', 2) some 'real information', (why we add the qualifier 'real' will be explained below), and 3) the act of knowing or being aware/conscious.

In the case of a sensory experience, for example, seeing an apple, the perceived information is different from both the apple and its biological/neural map created in the brain/body of the human (living) being. It is useful to note this difference because according to neuroscience, every subjective (conscious) state such as a conscious intention or conscious emotion, or perception of an external object, occurs only if a required and correlated neural process takes place[11]. Each conscious state has its associated neural correlates of consciousness: one for seeing a red patch, another one for seeing grandmother, yet a third one for hearing a siren, etc.(Mormann and Koch 2007).Interestingly, one is never aware of the existence of the neural correlate (NC) in one's own brain. One is only aware of the NC's 'meaning', which must have been created along with the NC. In contrast, a neuroscientist monitoring the brain can see an image of the NC on the monitor but does not directly know the NC's'meaning' (what the brain's owner is aware of). The neuroscientist will have to accept whatever the brain's owner reports as his/her experience. Observation of matter involves senses; thought or RI is not accessible to senses, in other words, RI is non-physical/unphysical. Note however that **although unphysical, RI does exist**.

'Real' Information (RI) is different from matter. We (human beings) can report our conscious experiences to others, if we wish to do so. When we do, we use a language and any of several means: sounds, electrical signals, write on a paper, and so on. In any means of communication we ASSIGN meaning or information that is in our heads, to structures of matter or material energy. These structures carry a mapping of the RI; the structures themselves are not identical with the RI[12]. Yet, in our daily lives, we do not distinguish between RI and the means we use to communicate or store it outside our heads. For example, we say "the book has good information about the city" whereas the book only has words whose meanings exist in our heads but not in the book. Hence hereafter, we may call the information content of any of our experiences as 'real' information, to emphasize that it is different from the language or energy signals used for its storage and communication or the corresponding neural/biological activity in the body.

Fortunately for us, no means of communication, or information storage device, or a computer ever creates or assigns any new RI overwriting what we intended it to carry! Hence, we may assume that lifeless matter outside a living being's body does not create RI all by itself. On the contrary, as long as we are awake, we experience more and more, and accumulate RI in our memory. This memory has two components: biological and mental. RI is mental; the biological component is what a monitoring instrument can convey physically/scientifically. We will explain later how the living matter in brain/body not only creates a biophysical map of a material object

[11]This scientific fact does not imply that an experience's information content is the same as consciousness. Neural processes do create the information content. Once created, the information is stored in memory and one is not conscious of it again until it is retrieved when one tries to remember it. One has a conscious experience when it happens the first time or whenever it is remembered because of a certain 'ability to know' which may be called consciousness and is different from the information content.

[12]To begin with, a word in any language is not identical with its meaning because the same meaning may be conveyed by different words in different languages. A language is a mapping of RI into words (symbols) which become sound energy when pronounced, particles of matter when written on paper, and become electrical energy when transmitted over a telephone line, and so on.

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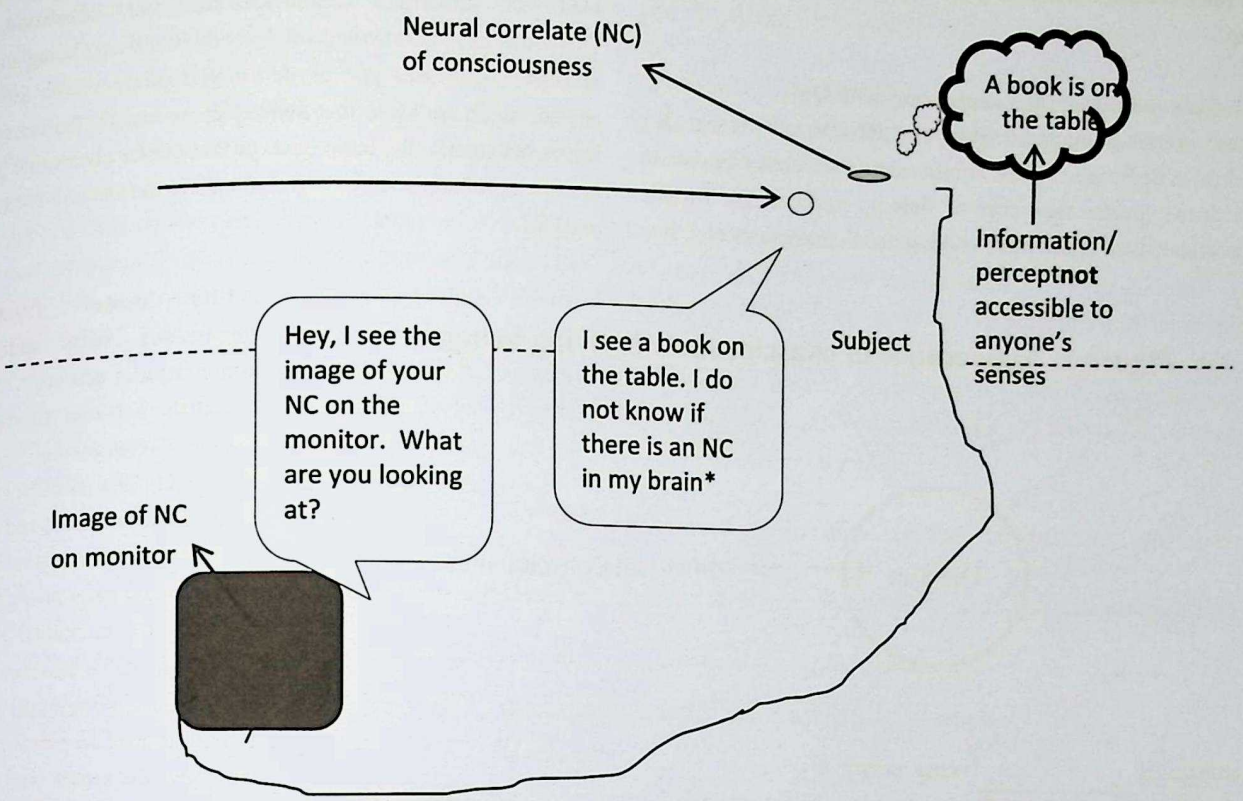
Figure 1. Sensory experience and its neural correlate in the brain



*These words are **not** identical with the information existing in the subject's mind. The information is merely **assigned** to these words, which are then mapped to sounds.
The NC is **not** identical with its 'meaning' either.The brain's owner is aware of only the 'meaning' but not aware of the NC whereas the neuroscientist sees only the NC's picture but does not know the 'meaning'because the monitor cannot transmit it.

accessed by its senses but also creates a 'meaning' of the map, i.e., the associated RI.

Two kinds of Information: Bernard Carr (2013) puts RI in our minds into the following categories:

1. RIgenerated by sensory stimuli and stored for use inreplay of images and events experienced in the past.
2. RIgenerated and controlled by imagination, related to creativity; examples: desires, concept of infinity. Thoughts which at least directly, do not depend upon sensory stimuli seem to exist in the mind.
3. RI in dreams possibly generated by the interplay ofmemory and imagination.

The above list shows that any of our conscious experiences is one of two kinds: 1) a sensory experience (SE), or 2) an experience of imagining (EI) an object or event without direct useof senses. Although the RI content of both an SE and an EI is subjective, an SEallows other individuals to seemingly verify its RI content whereas an EI clearly prohibits any such verification. For example, consider a book lying on a table and two or more observers, all at rest with respect to the table and the book, and not too far from them. Light signals from the book and the table reach all observers' eyes and processed by their brains. Each observer has an experience of seeing the book on the table. These observers can communicate with each other and agree or not about what they have just seen. Usually they all agree upon the position and other characteristics of the book and the table. That is why we are inclined to say that SEsare 'objective' whereas in the case of EI, no such verification is possible; for example,one's dream can never be verified by another (not considering mind-reading phenomena, which are rare).

Two kinds of matter: A quantum particle (QP) is a micro-particle and not accessible to senses but we do not call it unphysical! — Perhaps because we can design a suitable experiment to 'observe' its position and some properties. Actually, we never observe it directly by senses. We only 'infer' its position or a property from the reading on the measuring device! The outcome of a measurement (what reading the deviceproduces) is not definite but only one of many possible outcomes that are predictable along with their probabilities, by quantum mechanics (QM). We call such matter whose existence and properties can be inferred by us in certain circumstances (in suitably designed experiments) as quantum matter. The 'observability' aspects of quantum systems are analyzed by QM. Quantum theory is confirmed by experiments overwhelmingly.

In a QM measuring experiment, the measuring deviceis said to be macroscopic and classical; it means that the device can be accessed by a sentient observer by senses and produces an unambiguous and unique experience in his/her mind. Hence we may say that matter is of two kinds: quantum and classical. Our physics says that classical matter is made of numerous quantum particles. Hence, while we say classical matter is physical, we may say that quantum matter is semi/quasi/pseudo-physical. The criteria for the production of classical matter from quantum matter are still not understood clearly;

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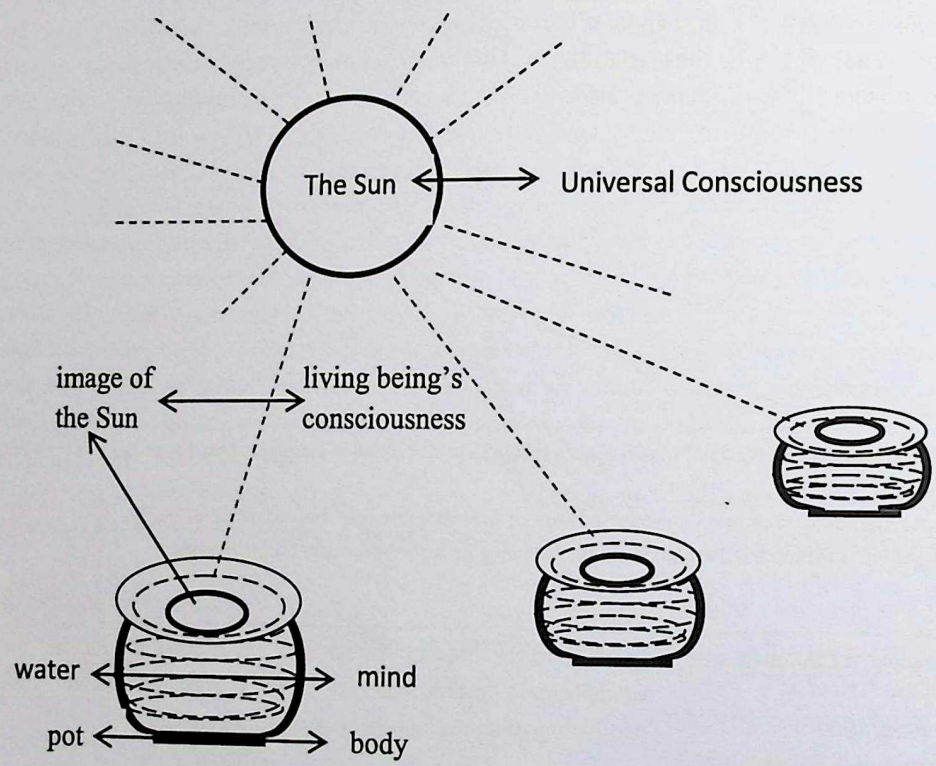
lack of this knowledge is probably part of the so called 'measurement problem'.

3. Matter comes from life - consistency with QM

Quantum matter is made of 'objective' RI:QM tells us that QPs are packets of de Broglie's phase waves, each of which is supposed to have a speed greater than that of light in vacuum. De Broglie (1925)postulated the phase wave anddescribedit mathematically; it is

Figure 2. Appearance of consciousness in living beings



an idea in physicists' minds because the wave cannot be heard like a wave on an oscillating string or seen as an electromagnetic wave perceived as light. Hence one may say that the phase wave is subjective. But at the same time, its wavelength canbe measured in a suitably designed experiment, for example, in the double slit experiment. So, we may say that the de Broglie's phase wave is 'objective information'!Since all matter is supposed to be made of QPs, it followsthat classical matter, i.e., matter which is observable directly by senses isalso made of 'objective information', i.e., RI, which is not observable directly by senses, albeit has properties thatcan be measured by classical devices and verified in some way, and agreed upon by a group of people.Since we already saw that RI exists only in living beings but not in lifeless matter, clearly, QM implies that matter comes from life.

Interestingly, Sankhya (a branch of Indian philosophy parts of which are assimilated into Vedanta) includes the same theme in its model of creation of the universe. Sankhya says that gross elements (earth, water, fire, sound, and space) are made of subtle not-tangible elements called *tanmatras*[13], which are potentials/faculties for the five kinds of sensations (Prabhvaananda and Isherwood, 1953). Tanmatras exist in the mind/subtle-body of a living being and are not accessible to senses just as de Broglie phase waves are not. Of course, we do not know that *tanmatras* are exactly the same as phase waves but clearly, the basic concept that matter observable by senses is made up of some subjective elements is the same in both Sankhya and QM.

4. Life comes from life- consistency with neuroscience and computer science

Vedantic Solution to the 'Hard Problem'-*Pratibimba* analogy: Bhagavad Gita (2012), which is based on Upanishads and which is one of the primary sources of Vedanta describes *jiva* (translated as soul), the embodied individual being, as an infinitesimal spark from Consciousnes and therefore eternal as well.*Jiva* draws to itself the body, the senses, and the mind that are constituents of *prakriti*, the insentient Nature. Vedanta considersmind as an accumulation of RI; mind is a memory containing the individual's experiences, desires, emotions, etc., and endowed with the perceptual faculty, ability to think, argue logically, intellectual abilities and ability to make decisions based on past experiences and future goals. The sense of 'I'/ego that claims a personal identity and ownership of actions is also part of mind.A major difference of Vedanta from Western philosophies is that Vedanta emphasizesthat the mind,although subtle (i.e., not accessible to the physical senses: see, hear, touch, taste, and smell),is also asense(called thesixth or the eleventh sense in different contexts), implying that the mind is only instrumental in creating our conscious experiences but it is not conscious by itself. The philosophy frequently emphasizes that mind is restless and faster than senses and matter (that is why subjective).

If the mind is not conscious, how come we have so much conscious experiences in our lives? Vedantaanswers this question using the following analogy: When sunlight falls in a pot containing water, it is reflected by the water creating an image of the sun. The image has some brightness but its origin is in the sunlight and not in the pot nor in the water. A living being's body is similar to a pot and its mind is like the water in the pot. Consciousness is the sunlight. The living

[13]One definition of *tanmatras* is: the five qualities of the gross elements (space, air, fire, water, and earth) that subtly manifest in the mind as sound, touch, form, taste and smell (http://www.iskconpress.com/glossary).

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being's consciousness is like the image of the sun in the water[14]. There are as many reflections as there are pots with water. Theyvary in quality depending upon the reflecting medium (purity of the intellect), for example, the image is not clear if the water is not pure or has waves.Just as there is no reflection in an empty pot, there is no appearance of consciousness in lifeless matter but only in living beings because the latter have minds. Again, just as the reflection is gone if the pot is broken but the sun and its rays still remain, the mind cannot exhibit its apparently conscious behavior after the death of the physical body but Consciousness and *jiva* are there forever. Sankhyakarika (Swami 1995) states that the world can only be experienced when both *sthula sarira* (the gross body) and *sukshma sarira* (the subtle body same as the mind) are present together (interacting). Thus Vedanta recognizesthat both the mind and the body participate in creating conscious experience in a living being.

5. Consistency with Neuroscience:

In an earlier section, we noted that according to neuroscience,a human (living) being becomes aware of a sensory stimulus or of a thought, emotion, desire, etc., if and only if a correlating neural record or activity exists in the brain. We also noted thatevery such experience-causing biological trace (a pot) in the brain's memory has an associated 'meaning'(water in the pot). Indeed, in the sensory-stimulus-and-response experiments by Liber et.al (1979), attainment of neuronal adequacywas required for the experience of stimulus to occur. In the case of volitional acts, cerebral activity started at least 350 msec before the conscious wish to act appeared (Libet 1999), again suggesting that neuronal adequacy representing the intention needs to be achieved for awareness of intention to appear.Consistency of Vedantic solution to the 'hard problem' with neuroscience is seen for example in Figure 1, by comparing NC to a pot and the percept to the water inside.

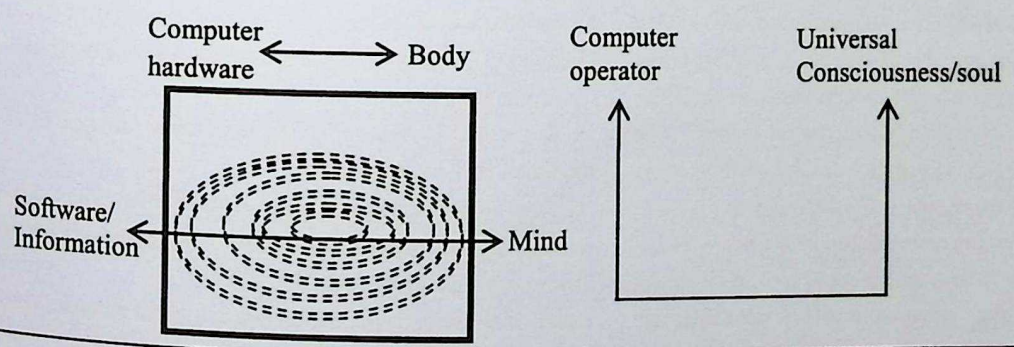
However, the *Pratibimba* analogy does not model body-mind interaction. It merely says that a conscious experience occurs only if the RI content and its corresponding NC are present in the brain/body but it does not say for example in Figure 1, how the percept of the book lying on the table is created along with the neural map of the table and the book.Vedanticanalysis of body-mind interactions answers this question.

Body-mind interactionsaccording to Vedanta –Living-being-computer analogy:

Chapter 13 of Gita called *Shetra Shetrajna Vibhaga Yoga* describes the distinctions between the body mind complex and the one who 'knows' them (*shetrajna*). The Field of activity (*shetra*) consists of the five elements, the ten organs, sense objects, the ego (*ahankara*), desires, aversion, emotions, experiences (*manas* and *chitta*), and intellect (*buddhi*). The five elements are the earth, water, fire, air and the sky. The five objects of the senses are sound, touch, form and color, taste, and smell. In *Karma Yoga* chapter, Gita says that the senses influence the body, *manas* and *chitta* influence the senses, *buddhi* influences the *manas* and *chitta,* and *jiva* influences buddhi. All contents of the Field, namely, the body, its environment, and the mind are not conscious.Vedanta recognizes both mind's action upon the body and the body's role in creating experience, but considers mind neither as a state of the biological matter in the body nor as an emergent property of it.In fact, Vedanta proposes that the subtlest aspects of the mind, the accumulated latent impressions of all

Figure 3. Computer analogy of Consciousness, Mind, and Body Relations in Vedanta

The mind and the body are both not conscious just like the hardware and software of a computer. Only Consciousness and soul really know and have control over all that happens in an individual's life. Mind is subtle and its magic is visible only when it is working with the body similar to the way the capabilities of software (also subtle) are visible only when it is loaded into the computer and activated.



[14] Brahmasutras mention *jiva* as a reflection (*Pratibimba*) of *Paramatma/Brahman*/Consciousness. Srila Jiva Goswami explains the sutras as follows: *jiva*, being by nature like an atomic ray of the sun (like those rays that fall into a single pot), is neither different from the sun nor is the same as the sun; *jiva* is simultaneously one with and different from Consciousness. (http://www.harekrsna.com/sun/editorials/sandarbhas/tattva/sandarbhas42.htm) Although *Jiva* is conscious, unlike Consciousness, *jiva*may be influencedby lusty intelligence andidentify itself with its own reflection in the circumstantial material body and mind, and acquire*ahamkara*, i.e., false ego. Then *jiva*, the spirit soul begins to own the attributes of the body, begins to experience the temporary misery and happiness of material life,and becomes addicted to enjoying material senses(Bhagavadgita 2012).

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past experiences, and desires called *vasanas* survive the death of the physical body and are carried by the immortal *jiva* who enters them into another body for fulfilment of desires. This is the principle of reincarnation believed in all major Eastern philosophies and religions and not found in Western philosophies and religions.

Body-mind interactions described by Vedanta can be summarized in an analogy as follows: In the sunlight-pots-with-water analogy, replace the pot with a computer's hardware and water with the computer's stored information; replace the sun whose light originates the reflection, with the computer operator. Information/software cannot exist outside the hardware like water cannot stay in one place outside a pot. Similar to an empty pot that cannot show reflection, the hardware of the computer cannot display any intelligent interactive behavior unless it is loaded with some software. We now have the living-being-computer analogy which models body-mind interaction.

Information stored in a computer is of two kinds: data and programs. Data are passive;any program is passive until it is activated. A stored program has to be initiated into execution either by an external input, or an already running program. Once activated, the program runs and creates outputs which are new records in the memory. To do even the simple task of creating a record of any input, the computer needs to have a "WRITE" instruction, a program, already in its memory. The input entered by the operator activates the stored program, which then runs in the hardware (i.e., the hardware goes through a dynamic process) and creates the record, which is a passive data item. After the activity is over, the program goes back to its passive state. Artificial Intelligence programs produce both new data and new programs. So, activity of the software, that is, running programs in the hardware creates more records/information in the computer's memory. Similarly, any new experience of a living being is the result of activating a certain thought-process stored in the living being's memory, to interactwith the body's biological matter[15]. The interaction produces a linked pair ofrecords, one biological and one mental, representing the new experience[16]. For example, in Figure 1, while the brain creates the neural representation of the book-on-the-table, the perceptis also created because the mind is already paying attention to the senses. Paying attention involves what Vedanta describes as mind's influence on the body and the senses. Unlike in a computer, the experience is a conscious one because of the underlying consciousness of *jiva* because of the sunlight-pot-water principle.Similar to a computer,a thinking activityin a living beingmay be initiated by an internal desire/purpose, or by external sensory stimuli, *jiva* or by God (Consciousness).Just as a computer's hardware with no appropriate software is loaded into it, cannot by itself produce a new program,so also, lifeless matter (similar to hardware with no software), which has no mind/'real-information' cannot produce a new life whose components necessarily include both body and mind (both hardware and software).

6. Conclusion

Vedanta is consistent with the finding of modern neuroscience that every conscious experience has its associated neural correlate. In addition, Vedanta explains why conscious experience is subjective, i.e., not accessible to senses or material instruments; the experience is subjective because its content, which we called RI is faster than physical matter! According to Vedanta, a conscious experience occurs in an individual living being and not in lifeless matter because in a living being, the body and the already existing mind/RI interact producing new RI (water) and itscorrelatedphysical trace (a pot containing the water) as if to support the RI; the new RI appears to be conscious because of the reflection of Universal Consciousness (sunlight) formed in it. Lifeless matter has no mind to begin with and therefore cannever produce RI.Vedantic assertions that "life comes from life" and "matter comes from life" are consistent with modern science contrary to the belief of some scientists that biological matter in living beings produces consciousness.

[15]Similar to a computer program, at the end of a thinking activity which involves both body and mind, those mental contents which participated in the activity still remain passively in the memory Forexample, a violinist has the ability to play violin but he/she does not play violin all the time. The ability to play violin is stored in the musician's memory in a passive state and he/she activates it to perform. He/she enjoys the music while playing violin and remembers the experience even afterwards. After the performance is done, the ability to play violin is still there and no one else knows about the musician's talent unless he/she performs.

[16]Assuming Vedanta's theme that mind is faster than matter, mind brain interactions can be described as tachyon interaction with ordinary non-relativistic matter. This mathematical model of mind-brain interaction shows how the brain creates new RI in the form of tachyons if the mind pays attention to the brain (Author 2011). This model also explains why every subjective experience (including remembering a past experience and imgining a future event) happens 'now' in one's mind (Author 2016). This model was successful in explaining and justifying Eccles's hypothesis about the role of volition in exocytosis, the basic process of inter-neuronal communication (Author 2008), and Libet's causal anomalies (Author 2014).

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Talk 4:

Thermodynamics Challenges to the Materialistic View of Origin of the Biological System-a Review

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Abstract
In the physical science, the thermodynamics is an exact science which deals with transformations of matter and energy, suggests concatenations from order to disorder, from complexity to simplicity, while the biological sciences is a progression from simple to increasingly complex forms of biological systems, seemingly in contradiction to the second law of thermodynamics. Clausius formulated the second law of thermodynamics, and he stated that "The energy of the universe is constant, the entropy of the universe tends toward a maximum" [1]. The Origin of the biological system is the biggest challenge for the materialistic scientific community to explain the exact process origin of the biological system. Classical thermodynamics predicts that macromolecules of biological systems are more energy rich than their precursor and hence they can never form spontaneously in the early earth prebiotic conditions [2]. This challenge has motivated scientists to develop the new hypothesis for enhancing the possibilities and reducing the requirements, but these ideas couldn't progress from speculation to any plausibility. [3] Scientists do not know the exact process that led to the formation of the first biological system on earth. Scientists from National Academy of Sciences stated, that "for those who are studying the origin of life, the question is no longer whether life could have originated by chemical processes involving nonbiological components. The question instead has become which of many pathways might have been followed to produce the first cells" [4]. Each dimension of the biological system can be explained in the domain of physics and chemistry, but physical sciences have no perfect answer to tell about the origin of the biological system. The biological system (life) exhibits the characteristics that rewrite the laws of Physics and chemistry. [5] This paper briefly reviewed the current state of affairs of the materialistic view and followed by the thermodynamic challenge in the formation of the first biological system. This paper concluded with the flawless alternative to this one of the most vexed problem of the origin of the biological system.

Keywords: Biological System, Materialistic View, Thermodynamics, Negentropy, Origin of life, Vedic View.

1.Introduction:

Why are we talking about thermodynamics when we are talking about the origin of the biological system? Peter Molton has defined the biological system as "regions of order which use energy to maintain their organization against the disruptive force of entropy."[6] It is thermodynamically possible to explain the complexity in an existing that energy flow through the biological system can be effective in organizing the simple organic compounds into the complex macromolecules.

On account of thermodynamics, we can understand that how macromolecules work in an existing biological system. But the origin of the macromolecules is thermodynamically challenged. Since a mechanism for coupling the energy flow to the organizing work is impossible to explain through materialistic hypothesis because for the explanation of any mechanisms they need existing biological system and that is why this mechanism is unknown to prebiological systems. [2] According to materialistic view, the origin of biological system is a spontaneous accumulation of some chemicals. When chemicals react with chemicals is known as a chemical reaction, and only chemical reactions do not produce Biological system. For the formation of biological system, we need pre-existing biological system. In my whole life and career, I never came across even a single example which shown that biological system is resulting from the chemical reaction.

As a Chemist, I am trained to understand chemistry, but this is not the way how chemicals react. Can we understand the mechanisms of the reaction of chemicals by merely knowing the Chemical and physical processes? No, we need controlled experiments. And the controlled experiment was impossible during prebiotic earth conditions. Therefore materialistic hypothesis can never be established and can never explain about the mechanism of the formation of first biological system. However, this is not the only problem with the materialistic view. Materialistic scientists can only look at biological system as it exists today, an entirely developed and well-organized system and tried to develop their hypothesis and then they conduct experimentation based on their observed data. But they least bother about the process of origin of the biological system. When scientists study the origins of the biological system, they propose that all biological system resulted from chemical reactions, overlooking the fact that chemical processes do not react in this way [7].

Many of the Scientists knew that Proteins and DNA are complex macromolecules and are building blocks of biological systems. Cells which make up the biological system contain DNA, the blueprint for all biological system, and proteins regulating biochemical processes. By the studies of all these components of biological system, our leading scientists concluded that these components are the primary cause or

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building blocks of origin of the biological system. However, after reviewing the more research studies and close examination, it is concluded that if all the biological systems have proteins and DNA, so do dead bodies. These are the essential components of biological systems. Then, what is the difference between the living biological system and dead biological system? Why we called it dead body. The materialistic view has no answer for this because materialistic view believes that these components are the responsible for originating the biological systems on early earth environment. Then, why they fail to originate a biological system by the combination of all these complex dead macromolecules. Materialistic hypothesis only can be made an attempt to understand the physical process and chemical reactions of different macromolecules present in the existing biological systems. These macromolecules only can play a role in maintaining or organizing the biological system in the presence of sentience. Despite the fact that the same macromolecules are present in the dead body, but they never take part in any chemical reaction and physical process in the absence of sentience [8].

Szent-Gyorgyi, a Noble Prize winner, presented the outcome of the materialistic view, "As scientists attempt to understand a biological system, they move down from dimension to dimension, from one level of complexity to the next lower level. I followed this course in my studies. I went from anatomy to the study of tissues, then to electron microscopy and chemistry, and finally to quantum mechanics. This downward journey through the scale of dimensions has its irony, for, in my search for the secret of life, I ended up with atoms and electrons, which have no life at all. Somewhere along the line life has run out through my fingers. So, in my old age, I am now retracing my steps, trying to fight my way back" [9].

Therefore, it is explained, even in the eastern and western philosophy, that "life is understood as a cognitive or sentient principle. Sentience cannot be manufactured artificially by any noble mechanical and chemical arrangement of dead atoms and molecules" (dead matter) [8].

2. Gordian's Knot in the formation of Building blocks of Biological System:

Scientists are learning from the various hypothesis, experiments, and results that the complexity required for life concerning 'biomolecule formation and self-organization' seems to be much greater than the complexity available by the materialistic process of origin of the biological system from lifeless chemicals [3]. Let's look into the next subsection:

2.1 Instability of building blocks:

Early earth prebiotic environmental conditions were not favorable for the formation of the building blocks of life because the tendency of biological macromolecules to break into the other building blocks. [10] Some of the biological macromolecules are very unstable and react in the wrong ways with other building blocks such as sugars, and other carbonyl (>C=O) compounds and also they react with amino acids and other amino compounds destructively and form imines (>C=N). Shapiro in an article critiqued the 'origin of life scenario,' he pointed out that both cyanoacetylene and cyanoacetaldehyde are produced in Miller-Urey experiments with an unlikely methane/nitrogen mixture, but NH_3, H_2O, and hydrogen sulfide (H_2S), and this reducing atmosphere significantly hindered the formation of cyanoacetylene and cyanoacetaldehyde. In contrast, most of the materialist scientists believe that the primitive atmosphere was 'probably dominated by CO_2 and N_2.' [11] In spite of producing cytosine, cyanoacetylene and cyanoacetaldehyde would undergo side reactions with other nucleophiles. Consequently, this reaction destroys any prebiotic amino acid in the presence of water as the destructive molecule. Instability of building blocks molecules shows the improbability in the formation of most essential building blocks of the biological system [12]. This is one of the major challenges for the materialistic hypothesis.

2.2 The Nucleophilicity of Water:

The nucleophilicity of water causes the degradation of biological macromolecules (including DNA and Protein) during the reaction process. The assembly of nucleosides, nucleotides, and nucleobases, and the assembly of oligonucleotides are all thermodynamically unfavorable in water. And polypeptide chains that join amino acids are also thermodynamically unfavorable. As we have explained in the previous section that polypeptide chains spontaneously hydrolyze in the presence of water and that is the reason two amino acids cannot join. But opposite reaction to yielding their constituent (amino acids) is thermodynamically favorable. [13] This would be even more of a problem of materialistic hypothesis for the formation of biological macromolecules in early earth conditions.

2.3 Chirality problem:

Materialistic scientist speculates that optically active enzymes can be formed in the early earth prebiotic conditions. But that was not the fact. Because enzymes and hormones, the proteins that make up our muscles, the glycogen in our liver and blood are all optically active. These are the naturally occurring substances, and nature always produces optically active substances. Thermodynamically, the left and right handed forms of a substance have identical free energy (G). Therefore the difference (ΔG) in the free energy is zero. The equilibrium constant for reaction (K) is the equilibrium ratio of the concentration of products to reactants. The relationship between these quantities at any temperature in Kelvin (T) is given by the standard equation:

$$K = \exp^{(-\Delta G/RT)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where R is the universal gas constant is 8.314 J/K mol. For the reaction of changing left-handed to right-handed amino acids ($L \longrightarrow R$), or the reverse ($R \longrightarrow L$), $\Delta G = 0$, so $K = 1$. The reaction reaches equilibrium when the concentrations of Right handed amino acid and Left handed amino acid are equal, that mean, a racemate is produced. Naturally, all enzymes are designed to work only with right handed sugars and left handed amino acids. Chirality' in biology demands chemistry to supply 'left-handed' amino acids and 'right-handed' genetic molecules. However, most of the chemical reactions in nature (except biological systems) yield half right handed and the half left handed mixture called a racemate. If somehow the reaction produced the opposite yield that is left handed sugars and right handed amino acids, then it can be toxic and can prevent the formation of biological macromolecules. By some means if sugars are manufactured, how would early prebiotic conditions have selected the structure of sugar out of a mixture that was exactly half "right handed" and half "left handed"? [14] Besides, equal

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quantities of both right and left handed organic molecules (racemic mixture) were consistently produced by the Miller–Urey experiment. But for the formation of biological system, we need all amino acids that can be used in proteins must be left-handed, and almost all carbohydrates and polymers must be right handed. The opposite types are not only useless but can also be toxic for the origin of biological system. [15], [16] [17] However, this does not solve the mystery of where the optical activity in the biological system came from in the first place. A recent world conference on 'The Origin of Homochirality and Life', made it clear that the origin of this handedness is a complete mystery to the materialistic view.[18] [14]

2.4 Reducing environment:

Early earth primitive reducing atmosphere has been severely challenged by the available data from geology, geophysics and geochemistry.[19-20],[21-23]. There is no geologic evidence for a reducing prebiotic atmosphere. David Deamer, an origin of life theorist says, "This optimistic picture began to change in the late 1970s, when it became increasingly clear that the early atmosphere was probably volcanic in origin and composition, composed largely of carbon dioxide and nitrogen rather than the mixture of reducing gases assumed by the Miller-Urey model. Carbon dioxide does not support the rich array of synthetic pathways leading to possible monomer" [24] Jeffrey Bada and his co-researchers also stated in against of the reducing environment that, "Geoscientists today doubt that the primitive atmosphere had the highly reducing composition Miller used". [25] In the Earth and Planetary Science Letters, it is reported, that chemical properties have been effectively unvarying over earth's history, and thus concludes that "Life may have found its origins in other environments or by other mechanisms."[26] In 1996 Miller himself stated, "We really don't know what the Earth was like three or four billion years ago. So there are all sorts of theories and speculations. The major uncertainty concerns what the atmosphere was like. This is a major area of dispute."[27] The Space Studies Board of the National Research Council suggested (1990) that origin of life scientists should undertake a "re-examination of biological monomer synthesis under primitive Earthlike environments, as revealed in current models of the early Earth."[28] In a review, Leslie Orgel has also expressed that, "The relevance of all of this early work to the origin of life has been questioned because it now seems very unlikely that the Earth's atmosphere was ever as strongly reducing as Miller and Urey assumed."[29] In NPR report Nick Lane, a biochemist states that "the primordial soup theory is now expired." [14] [30] there are many other leading scientists who have discarded the Miller-Urey Experiment and prebiotic environment speculations based on materialistic hypothesis of origin of biological system.

2.5 Oxygen As Enemy for Building blocks:

The ozone layer protects the environment; the upper atmosphere blocks harmful ultraviolet radiation. Ozone is composed of oxygen and is the biggest obstacle for the synthesis of the macromolecules of the biological system. Miller has also experienced the same problem during his experiment. The chemistry does not function if there is oxygen, but if there is no ozone (O_3) in the prebiotic atmosphere, the amino acids would be quickly destroyed by harmful ultraviolet radiation.[31], [30] It was believed that the results were not very significant because building blocks of life formed during the Miller's experiment exists only in extremely small amounts and decompose rapidly into a tarlike substance. Even though it was widely heralded by the materialistic scientific community to proving that biological system could have originated in early earth prebiotic conditions, but now after observing the results of some experiments, we can say that, these experiments are providing more evidence for exactly the opposite conclusion. [17]

2.6 Undirected Energy as obstacle:

Miller intelligently selected that wavelength which is useful to produce amino acids and screened out other wavelengths because they destroy amino acids. Both chemical building and chemical destroying light exist in sunlight. Amino acids are very delicate and readily break down under natural sunlight. The Miller–Urey experiment had strategically designed traps to remove the products from the radiation before they could be destroyed. Materialistic scientists such as Oparin, Haldane, Miller, and his successors suggested that the unguided energy as the means by which simple organic molecules can be organized into more complex molecules. Random flashes of electricity used by Miller can transform simple molecules into more complex macromolecules. But the very next moment, the same electrical flashes may destroy these same building blocks. The larger the building blocks, the faster they will be damaged. [30] Any amino acids formed in the early earth prebiotic conditions would be destroyed long before they could be removed. [17] Hence, it is next to impossible to direct the energy according to the demand of mechanisms in the early earth prebiotic conditions.

2.7 Polymerization problem:

Claudia Huber and Günter Wächtershäuser stated in a published paper that "the activation of amino acids and the formation of peptides under primordial conditions is one of the great riddles of the origin of life." [10] Thermodynamically, polymers tend to break into the water due to the very low equilibrium concentration. Le Chatelier's Principle explains that the presence of a product in the reaction medium (water) will substantially slow the reaction. [30] The reaction to form a peptide bond between two amino acids to form a dipeptide is given below:

(Amino acid 1 + amino acid 2 ⟶ dipeptide + water)

$$H_2NCHRCOOH + H_2NCHR'COOH \longrightarrow H_2NCHRCONHCHR'COOH + H_2O \quad .....(2)$$

The free energy change ($\Delta G1$) is about 20–33 kJ/mol, depending on the amino acids. The equilibrium constant for any reaction (K) is the equilibrium ratio of the concentration of products to reactants. The relationship between these quantities at any Kelvin temperature (T) is given by the standard equation:

$$K = \exp^{(-\Delta G/RT)} \quad .....(3)$$

Where R is the universal gas constant (Avogadro's number x Boltzmann's constant k) = 8.314 J/K.mol. For reaction (2),

$K1 = [H_2NCHRCONHCHR'COOH][H_2O]/[H_2NCHRCOOH][H_2NCHR'COOH] = 0.007$ at 298 K, where a compound in square brackets symbolizes the concentration of that compound. This means that if we start with a concentrated solution of 1 M (mol/l) of each amino acid, the equilibrium dipeptide concentration would be only 0.007 M. Since tripeptides have two peptide bonds, the equilibrium tripeptide

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concentration would be 0.0072 M or $5x10^{-5}$ M. For a nonspecific polypeptide with 100 peptide bonds (101 amino acids), the equilibrium concentration would be 3.2×10^{-216} M.

The problem for the materialistic scientist is even nastier because life requires not just any polymers, but highly specific. Since the equilibrium concentration of polymers is very low as noted from the above paragraph their thermodynamic tendency is to break down in water is much faster than to be built up. Some researchers speculate that high temperatures would accelerate the breakdown. Stanley Miller, also points out that polymers are 'too unstable to exist in a hot prebiotic environment' [32], [33] A recent article in New Scientist also described the instability of polymers in water as a 'headache' for researchers working on materialistic view on the origin of biological system.[34] [10]

3. Biological Systems do not violate the law of Thermodynamics: How?

We can understand this more precisely by following the sections below, that how biological system do not violate the law of thermodynamically. Organization of an existing biological system can also be viewed as emergent properties, for example, individual atoms can be combined to form molecules such as polypeptide chains, which in turn fold and refold to form proteins, which in turn create even more complex structures. These proteins, assuming their functional status from their spatial conformation, interact together and with other molecules to achieve higher biological functions and eventually create a biological system or organism. [35]

3.1 Biological System exhibits Irreversibility:

Biological systems are neither isolated nor closed systems but are the open system because they interchange energy and matter with their surroundings. The biological system seems not violate the second law of thermodynamics because their thermal state of nonequilibrium is lower than the thermal state of nonequilibrium of the environment. If it is not so, then the biological system would not be able to obtain energy from the Universe. Any biological system has to increase the state of equilibrium of its environment for maintaining a state of nonequilibrium. To be maintained in a stable state of nonequilibrium (minimal entropy), biological system has to acquire thermal nonequilibrium from a system in a state of greater nonequilibrium, in this case, the system with a thermal state of nonequilibrium greater than the thermal state of nonequilibrium of biological system is, the universe.

At present, the universe shows a thermal state of nonequilibrium greater than the total thermal state of nonequilibrium of all the systems and processes exists within it.

As stated by the second law of thermodynamics that energy is always transferred from a state of higher energy to another state of lower energy. [36] For instance, heat always tends to transfer from a hot system to the less hot system. The macroscopic systems also exhibit the same process of equilibrium level. The equilibrium of these systems is always transferred from a system in a higher state of equilibrium to another system in a lower state of equilibrium. Moreover, the equilibrium is always transferred from a system in a higher state of nonequilibrium to another system in a lower state of nonequilibrium. In this case, the universe is more nonequilibrated than a biological system. Therefore, nonequilibrium moves from the environment towards all biological system. And when biological system loses their capacity to transfer their equilibrium toward the universe, they will be in equilibrium. This is our understanding of death, and it fully obeys the laws of thermodynamics, which establish that all systems in the universe tend to increase their equilibrium, in other words, to attain absolute stability. [36]

If the biological system could somehow become isolated systems, then the only biological system can be capable of violating the second law of thermodynamics, would never face death, but in the real world, this does not happen. Even if the universe were an isolated system, it would still tend toward absolute equilibrium; a terminal state is also known as "the thermal death of the universe." It is possible for biological system to be in a state of chemical equilibrium, but not in a state of thermal equilibrium; they would die. After closely observing the biological system in the universe we can certainly be sure that there are no reversible processes in biology. All biological processes are irreversible. As we know that our knowledge of the reversibility in biological microsystems is highly limited. For example, we have not found a way to stop aging, or how to cure cancer and other degenerative diseases. The impediment of biological systems to reverse the metabolic processes which lead them to death is, indeed, what we biologists know as irreversibility. [36] Irreversibility occurs naturally in the biological systems. Can materialistic hypothesis explain about the irreversibility which we observe in plants which are the outcome of a seed? A seed cannot obtain its original form again after growing as a tree. Likewise in any biological systems, we never saw the irreversibility of age and physical form. This is one of the distinctive characteristics of the biological system that can never be defined by nonlife chemicals or by any materialistic process.

3.2 Biological System as Negative Entropy:

A biological system is often believed that violate the Second Law of thermodynamics because they can increase a level of self-organization. Ludwig Boltzmann a physicist was one of the first to speculate on a possible thermodynamic perspective in 1875, he stated, that "the general struggle for existence of animate beings is not a struggle for raw materials these, for organisms, are air, water and soil, nor for energy which exists in plenty in anybody in the form of heat, but a struggle for 'negative entropy', which becomes available through the transition of energy from the hot sun to the cold earth". [37] In the 1940s the Austrian Nobel-laureate physicist Erwin Schrodinger, first proposed the idea that "biological organization is created and maintained at the expense of thermodynamic order." In one of his famous book, 'What is Life?' (1944), he explained that life, contrary to the general tendency dictated by the Second law of thermodynamics, decreases or maintains its entropy by feeding on negative entropy and in a later he stated the true source is 'free energy.' [38] American biochemist A. Lehninger, argued in a book that the order produced within cells as they grow and divide is more than compensated for by the disorder they create in their surroundings in the course of growth

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and division, "living organisms preserve their internal order by taking from their surroundings free energy, in the form of nutrients or sunlight, and returning to their surroundings an equal amount of energy as heat and entropy." [39]

The biological system displays two preliminary processes, creating order from order, the progeny has the same order as the parent and creating order from disorder as every biological system does at every metabolic step, eating and growing. A biological system stays alive in its highly organized state by absorbing energy from the environment and processing it to produce a lower entropy state within itself. "Biological system feed upon negative entropy," they attract "negative entropy" to compensate for the entropy increase they create by living. A biological system is "negentropic." The existence of a biological system depends on increasing the entropy of the rest of the universe. No natural process can occur including metabolisms unless it is accompanied by the overall increase in entropy of the universe.

A Biological system is not a closed and isolated system, it is an open system, and exchanging both matter and energy with its environment. For example, a biological system builds cells, tissues, ligaments, etc. This process increases order in the body and thus decreases entropy. This is the local 'negative entropy' that characterizes all of the biological systems. Any biological system (animal or human); a.) Generate convection due to differences in body temperature and the environment, b.) Radiate heat into space c.) Consume energy containing substances (food), d.) Eliminate waste (e.g., carbon dioxide, water, urine, feces, and sweat). During all these processes, the total entropy of the system (the biological system and his environment) increases. When the biological system ceases to live, none of these processes (a. to d.) will take place in other words interruption in the processes (esp. c or d) will quickly lead to loss of life. Can some nonlife chemicals be prevented from decaying? Materialistic View has no answer.

3.3 Biological System favors the Coupling Reaction:

In 1985 Henry Morris stated that "The law of increasing entropy is a universal law of decreasing complexity, whereas evolution is supposed to be a universal law of increasing complexity." [40] In 1976, one of his paper, claims that all types of evolution are impossible because evolution "requires some universal principle which increases order, causing random particles eventually to organize themselves into complex chemicals, non-living systems to become living cells (chemical evolution), and populations of worms to evolve into human societies and what is the conversion mechanism that transforms amoebas into men (biological evolution). [40] The Second Law of Thermodynamics explains that during any reaction the total useful energy, the energy that is useful for doing work in the universe will decrease. For example, consider a ball rolling downhill moving faster. This reaction occurs due to the gravitational force which makes the ball do what comes naturally can be viewed as potential energy is converted into the kinetic energy of motion. [41]

According to the materialistic View there are two stages process for the origin of biological system, in first stage reactions formation of organic molecules which combine to form larger biomolecules like protein and RNA, which then selforganize into a biological system. For the first stage, a major problem is that many essential reactions are uphill in energy. Walter Bradley explains down-hill reactions and up-hill reactions by analogy with a pool table. Bradley explains that 'the difficulty in getting polymerization condensation reactions is that our pool table it has a hill and doesn't have a velly. He concluded that the formation of protein and DNA via polymerization condensation reactions is impossible. The changes in entropy and energy are both unfavorable for many essential reactions. A biological system can make these unfavorable reactions occur by coupling uphill reactions with downhill reactions, to make the combination energetically favorable. But for the 'origin of the biological system,' the coupling mechanisms would not be available because the biological system was not pre-existed on early earth atmosphere. Thaxton& Bradley say that the maintenance of biological systems is easily rationalized regarding thermodynamics, the origin of such biological systems is very difficult. [42]

3.4 Activation Energy can be controlled by Biological System:

According to the second law of thermodynamics, if a reaction violates the Second Law, then it is thermodynamically unfavorable and will not occur. But sometimes a reaction even allowed by the second law of thermodynamics that could occur does not occur because its rate of reaction is extremely slow, so it is kinetically unfavorable. This possibility is because 'chemicals tend to eventually end up in their (thermodynamically optimal) equilibrium state,' but not 'chemicals will end up.' For example, gasoline and oxygen can exist in a car's gas tank for years without reacting, even though their reaction is thermodynamically favorable and in some situations, they will react very vigorously. Gasoline doesn't burn in a car's gas tank it only burn in the engine. Why do they not react? Because these chemicals must overcome an obstacle 'an activation energy before they can react at normal temperatures when there is no spark or flame the collisions between molecules of gasoline and oxygen don't supply enough energy to let them overcome this obstacle and become "activated," so they don't react and are in a temporary metastable state. [41] Activation energies are biologically useful because they provide a kinetic obstacle so undesirable reactions are prevented, and desirable reactions can be controlled and this happened in biological systems. [42] This is the biggest obstacle for the non-life chemicals how they could overcome without the help of any biological system.

3.5 Biological System works as a Thermostat:

There are so many chemical reactions occur inside the biological system and do not occur outside the biological systems and molecules, macromolecules exist inside that would not exist outside the biological system. Why the biological system is so complicated like a big automated machine which is beyond the understanding of physical and chemical processes. Many reactions that usually are kinetically unfavorable can occur because of some proteins, which are called enzymes, act as catalysts that increase a reaction rate and make things happen by providing a way to lower the activation energy and bring chemicals together in a spatial orientation that is just right for reacting. Enzymes operate in the context of control

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systems that control which reactions do and don't occur, and when. These control systems are analogous to a thermostat that turns a furnace on and off, when we do and don't need heat, but are much more complex and wonderful.

On the other hand many reactions that usually are thermodynamically unfavorable can occur when they are coupled with another reaction. The biological system uses external fuel the chemical potential energy stored in the foods and the oxygen (we breath) to produce internal fuel (with energy temporarily stored in 'high energy' molecules such as adenosine triphosphate, ATP) that is used to drive these coupled reactions. Biological system maintained their unusual state had high chemical potential energy, with low constraint entropy and normal temperature-entropy by using external energy from the sun, with solar energy first being directly consumed by plants, which convert it into chemical potential energy that can be consumed by animals. In both plants and animals, coordinated biological systems produce the mechanisms of life operating in rate increasers, control systems, coupled reactions, and in many other ways [42] that show that an existing biological system is also worked as thermostat for many chemical reactions and maintain the favourable environment for reaction, but this is very difficult in the prebiotic atmosphere or by controlled experiments. Materialistic scientists cannot explain this thing because they are busy in the formation of biological systems by the laboratory experiments from non-life chemicals which are next to impossible.

3.6 Biological System as Energy Converter:

Thaxton& Bradley [2] explain, how biological system use biochemical process to produce a metastable environment which is not thermodynamically favorable, since the system's low constraint-entropy is not combined with a high temperature-entropy, by converting externally available energy into internally useful functions, in a way that causes the overall entropy change in the universe (system + surroundings) to be thermodynamically favorable, consistent with the Second Law. In other words, localized areas of relatively low system-entropy can be maintained by a flow of energy. For example, supplying energy to a refrigerator can lower the temperature inside it, even though this would never occur (and it would violate the Second Law) under ordinary circumstances. But as long as energy continues to flow through the refrigerator, and its 'mechanism that produces cold' is operating properly, the low-entropy cold area can be maintained in a way that is consistent with the Second Law.

Similarly, energy flow through the biological system can occur due to the mechanisms that maintain life, which convert external energy (in photons or food) into biologically useful functions maintain our bodies in a low-entropy state. Thaxton and Bradley [2] explain about the necessity of coupling mechanism. "Maintenance of the complex, high-energy condition associated with life is not possible apart from a continuous source of energy". And a continuous source of energy alone is not sufficient to explain the origin or maintenance of biological systems. The additional crucial factor is a means of converting this energy into the necessary, useful work to build and maintain complex biological systems from the simple monomers that constitute their molecular building blocks. Without such an 'energy converter,' non-life chemicals cannot do anything as materialistic scientists are trying to prove by their various hypothesis.

As we can understand that when a biological system consumes food, that food will do very little or almost negligible for a biological system whose stomach, intestines, liver, or pancreas were removed. Without these internal necessary organs, that biological system would surely die even though that biological system continued to eat. We can see from the above processes given the availability of energy and an appropriate coupling mechanism, the maintenance of a biological system far from equilibrium presents no thermodynamic problems. However, we can see the important difference between producing a coupling mechanism during chemical process (according to materialistic hypothesis) to produce the first generation of biological system and maintaining the biological system. [42] Therefore it has been noted from this complete section (3.1-3.6) that, for these crucialmechanisms we need living biological systems and not a lump of dead atoms and molecules. Thus, the maintenance of the biological system is rationalized in terms of thermodynamics that mean it is thermodynamically favorable. But the origin of the biological systems according to the materialistic view is implausible. This is the unique characteristics of biological systems to maintain the system and this offers a significant challenge to materialistic view.

These all are the characteristics of quintessential things of biological systems, like irreversibility, negentropy, coupling reactions, control of activation energy, thermostat, mechanism of energy converter etc. can be explain by the law of thermodynamics in an existing biological system and an existing biological system does not violate the law of thermodynamics

But the same law can never be successful in explaining the origin of a biological system by any materialistic process, in other words, the process of formation of a biological system is badly challenged by the laws of thermodynamics.

4. Alternative View for the Origin of Biological System:

The second law of thermodynamics is far more complicated when applied to the origin of biological systems than the further development and maintenance of the biological system since there is no standard model in materialistic view which could explain the formation of the first biological system. As specified by the materialistic view, the same law of logic can be applied to the mechanical, chemical and biological objects because ultimately they all are material objects [43] and they can be created and manufactured by the same process. On account of this understanding, materialistic view claimed that biological system formed from non-life chemicals in controlled experiments in early earth prebiotic atmosphere. However, all these materialistic ideas, hypothesis, theories, and experiments are thermodynamically challenged at every single step of formation of the Biological system with insignificant results at the end of the process. This

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means that biological system neither a product of a combination of non-life chemicals nor is it the result of any material process, pattern or design. Many sincere and thoughtful scientist will agree that materialistic view does not explain anything about the origin of biological systems they only explain how the biomolecules might have formed in early earth environmental conditions. [44] They could never form even a single blade of grass, how they can be successful in the formation of the most complex biological system.

It is concluded that any attempt in explaining the origin of the biological system will be problematic until the scientists do not know the exact process that led to the formation of the first biological system on earth. Scientists from National Academy of Sciences stated, that "for those who are studying the origin of life, the question is no longer whether life could have originated by chemical processes involving nonbiological components. The question instead has become which of many pathways might have been followed to produce the first cells". [4]

As we studied in biology textbooks that the many mechanical, physical and biochemical processes are involved in the physiological processes of biological systems. The basic processes of the biological system include organization, metabolism, responsiveness, movements, and reproduction, growth, differentiation, respiration, digestion, and excretion, etc., all of these processes are interrelated. Cell metabolism describes all of the chemical reactions that are happening in the body, anabolic reactions, create needed products in this process, cell consumes energy to produce larger molecules. Other reactions, called catabolic reactions, this is an energy releasing process in which a chemical or food is broken down by degradation into smaller parts. Our body is performing both anabolic and catabolic reactions at the same time and around the clock, twenty-four hours a day, to keep your body alive and functioning. Even during sleeping, our cells are busy in metabolism. [45]

Thanks to the modern development of advanced biological techniques that complexity of the cell has come to light. This complexity has proven to be a major challenge to the materialistic view who believed that such cells could have been formed by chance assembly of the biomolecules in a primordial soup of the primitive earth. Even such elementary cellular life forms show such a systematic unity that can only pre-existing bijam (seed/soul) or implicit concept could explain its formative origin. [46]

Biologically, we can say, that growth of biological system is due to the multiplication of cells through various types of divisions like mitosis or meiosis. But why any cell starts dividing at the first place? Why a fertilized egg (after the sperm cell unites with egg cell) undergoes divisions which result in the formation of the whole body? [44] Traditionally, in the both eastern and western philosophy, life is understood as a cognitive or sentient principle. Sentience cannot be manufactured artificially in any laboratory by any mechanical and chemical arrangement of dead atoms and molecules. [8] Vedic scriptures explain it is "the soul (atman) that does all the work of the machines in maintaining the organism's functioning, plus supplying the order and sentient awareness within the body. We can supply the energy by some machines to maintain the body but we cannot make a body conscious with those machines." [8] Every sentient living biological system evolves only from some pre-existing biological system. Schrödinger, one of the founding fathers of quantum mechanics, also felt that life required some extraordinary laws to explain it. He said we must be prepared to find a new kind of physical law prevailing." [38] It is, therefore, intelligent to turn our research towards some authentic paradigm. Ancient Eastern philosophy, based on the Vedantic or Bhagavat paradigm, provides us a flawless alternative for this most difficult situation, "the origin of biological system", the concept of "Organic Wholism," confirms, in the invocation of Sri Isopanishad [47] "om purnamadah purnamidam purnat purnamudacyate purnasya purnamadaya purnamevavasishyate– The "Organic Whole" produces "organic wholes." [48] An "organic whole" cannot arise from some biomolecules that have to be assembled and lead to life, as claimed by materialistic hypothesis. That process can only produce mechanical machines or chemical processes, not living biological systems.[49] A similar conclusion was made by Rudolph Virchow[50] in 1858, "omniscellula e cellula" ("every cell comes from a cell"). In 1864, Louis Pasteur also demonstrated that life cannot arise from nonlife (abiogenesis is impossible) and with experimental evidence established the theory of biogenesis: Omne vivum ex vivo – life comes from life. [48] This is the scientifically verified law of experience. Life is essentially cognitive and conscious. In contrast to the idea of the objective evolution of bodies, as speculated by Darwin and the followers of materialistic view, Vedanta advocates the idea of the "subjective evolution of consciousness "[51] as the developing principle of the world.

4. Conclusion:

All the Materialistic theories, since Oparin to till date by great scientific brains, tried to prove this mystery in the domain of physics and chemistry. But they failed to unfold the mystery of the origin of the Biological system on early earth prebiotic environment. They are not ready to open their eyes in rationality while they are observing existing biological systems in everyday life. They could realize through rigorous study of physical laws and chemical reaction mechanism that evolutionary mechanism would not exist before life began, and neither would the complex biological systems that make unusual things happen inside our bodies. Consequently, the atoms and molecules which comprise living cells of the biological system individually obeying the laws of thermodynamics. But the origin and the proper organization of these atoms and molecules in a biological system are completely thermodynamically challenged. Prigogine et al., have noted, that "All these features bring the scientist a wealth of new problems. In the first place, one has systems that have evolved spontaneously to extremely organized and complex forms. Coherent behavior is really the characteristic feature of the biological systems".[52] [2]

Any parts in the biological systems cannot be separated from a system without disturbing the whole system because these are not only the part of the system but also as participants or members of dynamic whole. The participants are as essential to the whole as the

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whole is to the participants - this is the biological system or organism. Here we are removed from the stasis of fixed objects and are in the milieu of pure dynamical activity. Participants cannot be isolated from the whole in which they are participants and remain what they are. A DNA molecule can no more be what it is a producer of protein molecules than the protein molecules can be what they are as produced by the action of DNA and producing the DNA. Each participant is cause and effect of every other participant, as 'Kant' defined organism. Therefore nothing in an organism is without purpose, nor is the organism as a whole without purpose in the environment. Thus everything in the organism is both purpose [end] and means. [43]

A leading biologist Ernst Mayr wrote,"It is a little difficult to understand why the machine concept of the organism could have had such long lasting popularity. After all, no machine has ever built itself, replicated itself, programmed itself, or been able to procure its own energy. The similarity between an organism and a machine is exceedingly superficial." [53] Immanuel Kant, like Aristotle [54] before him and Hegel [55] after him, understood that an organism had to be distinct from both mechanical and chemical systems, and could only be understood within a teleological framework. For Kant, teleology exists when two criteria are met: The parts of a whole are possible only through their relation to the whole and the parts are combined into a whole by being reciprocally the cause and effect of their form. He, therefore, proclaimed that "There will never be a Newton of a blade of grass." [56] This is because there is no regulative law that can be formulated for a teleological system, the law applies only externally to mechanical systems, whereas teleology is an effect that is internal to the unity of the system.

If sentience is an essential driving force for all the organizational behavior in the most complex biological system, then, what is necessary to produce that biological system? The question is: "Why make a hypothesis about something that has never been observed? If we want to be scientific, then our hypothesis must match the data. Life comes from life is observed all over the Earth, and we might say, all over the universe as far as we have observed it. So where is the justification for claiming otherwise? Rather, we must conclude that the claim that life comes from matter is completely unscientific because it is not a conclusion based on any empirical observation at all. It is purely wishful thinking — a "naturalistic" or materialistic ideology that is masquerading as science. It is thus doubly deceitful since it is not only an unproven belief but an ideology that poses as a scientific theory". [57]

The Vedantic view rejects the objectivist theory of evolution as not only wrong but an impediment to the actual scientific comprehension of Nature. The Vedantic conception of Life is a fully differentiated/determinate one that displays its variety in and as a dynamic organic whole. The crucial element of interdependence that is missing in modern theories of insular organism life is fully embraced in what we may call the Post-Darwinian, post-reductionist, post-modern conception of Life the Vedantic conception offers. Organic wholism is a conception that has its inception as far back as the writings of Sri Isopanishad, where the first aphorism states, that "the Organic Whole produces organic wholes". [47]

When modern scientific theories failed to tell the truth about the origin of biological system, we should have faith on some flawless alternative to know about the Absolute truth, the origin of biological system and the origin of everything. Vedanta is considered the "most advanced form of scientific and theological treatise of spiritual and cultural heritage of India. Basic meaning of Vedanta is the Ultimate knowledge of Truth. Vedanta refers not only to Vedantasutra but also to all Vedic literature that describe the conclusion of the Vedas, specifically the Srimadbhagavad-gita, the Srimadbhagavatam, the Upanishads", etc. [58] It is confirmed from the Vedanta sutra, 1.1.2 and from the SrimadBhagavatam1.1.1, janmadyasy ayato 'nvayad itaratascartheshv abhijnahsvarat – the origin of everything is "abhijnahsvarat" – the unitary Supreme Cognizant Being, [59] the Supreme intelligent designer. In other words, Consciousness, comes from consciousness. It does not come from unconscious matter, as claimed by materialistic view. This is the Vedic conclusion "janmadyasyayatah", and it is scientific. This implies that whatever contradicts such conclusion must be unscientific, based purely on dogmatic ideology, or misguided hypothesis.

According to Srimad Bhagavad Gita,10.8, Supreme Being proclaimed that "I am the source of all spiritual and material worlds. Everything emanates from me". In verse 10.39, He informs that "I am the generating seed of all existences. There is no being-moving or non-moving-that can exist without Me". In 14.4 verse, He said that "It should be understood that all species of life, are made possible by birth in this material nature and that I am the seed-giving Father". In verse 11.32, Supreme cognizant Being said that, "I am the great destroyer of the worlds".[60] [61]

It is also confirmed by the Sri Isopanisad, mantra 1, "Everything animate or inanimate that is within the universe controlled and owned by the Supreme Cognizant Being."[62] According to Aitereya Upanishad 1.1.1-2, "He glanced over the material creation. He Created this entire material world". [63] It is mentioned in the Chandogya Upanishad, 3.14.1, that, "Everything, both matter, and spirit, is non-different from the Supreme Cognizant Being". It is also mentioned in the Chandogya Upanishad, 6.2.3, "When the Supreme Cognizant Being wishes to become many He glances and produces the material manifestation". [64] According to Taittiriya Upanishad, 3.1.1, "The Supreme Absolute Truth is that from which everything is born". [65]

It is confirmed in Sri Brahma-Samhita, 5.1 "the Supreme Cognizant Being the embodiment of Truth, Consciousness, and joy. He is beginningless, the origin of all that be, and the "Cause of All Causes. It is also stated in verse 5.35, "the Supreme Cognizant Being-the one Truth, both potency and potent-His potency in creating billions of universes is not separate from Him; every universe is within Him, yet simultaneously He is situated within every atom in complete Form. Such is the primeval LordGovinda who I do worship". [66]

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Ph.D.). I could not write even a single word without their mercy. I could realize the true meaning and purpose of science and its applicationsby the insightful instruction, guidance, and continuous encouragements of our Instructing Spiritual Masters. I wish to offer my humble obeisances to our Guruvarga (Sripad Bhakti MadhavaPuri Maharaja, Ph.D.) and great Acharyas (Sripad B.R. Sridhar Dev Goswami Maharaja and Sripad B.S. Govinda Dev Goswami Maharaja). I also wish to offer my humble obeisances at the Lotus feet of the Supreme Cognizant Being, without His Causeless Mercy I can never be successful in meeting with my bonafide Spiritual Masters.

Sri Sri Guru Gauranga Jayataha.

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Talk 5:

Origin of Heart Beat a Microcosm of Origin of Universe: Syncretism between Vedic and Kabbalah, Christian, Islamic Philosophies and Quantum Physics

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ORIGIN OF HEART BEAT

In medical science human body is often likened to a machine; a kind of robot with much higher functions than currently possible. A machine at Earth's gravitational surface follows the Newtonian Laws for e.g. action is equal to reaction. In other words for machine to do any work it has to be supplied by stimulus from an external agency. Thus it depends on external force / agency to produce any output. Contrast this with a living organism which develops the stimulus de novo even without application of an external force. In other words all living organisms particularly from animal kingdom are capable of spontaneous activity. It may be postulated that one of the tenants of live is automatic spontaneous activity. Interestingly, at least in mammals, the first spontaneous activity originates in heart (the pacemaker cells) and the heart starts beating one day after the fertilization although the sound is too fait to be appreciated by instruments designed by humans. Thus one may thus speculate that life emanates in the mammals in the pacemaker cells of the heart.

IMPORTANCE OF HEART AND HEART BEAT

The heart is the first organ to form during development of the body and also the first organ to beat. The pump function of heart is well known in human biology but that heart is seat of emotions has been speculated in meta-physics but a fact that is not well known is that 2/3rd of hearts energy is not used for pump function but for generating heat, which warms up the blood in its cavity. Thus if we compare body to cosmos, heart can be likened to a central sun from which all energy emanates towards periphery. [1]

Structurally, the heart is composed of specialized muscle cells called cardiac cells which are excitable, meaning that they can be stimulated electrically, chemically, or mechanically to produce an action potential. An action potential is a communication signal, allowing a message to be initiated and propagated within and between cells. Since it is a communication signal it is seen more in context of brain and nervous system, however, muscle cells are unique, in that excitation results not only in communication of the message but also in contraction of the cell due to the presence of certain proteins and mechanisms that link to the action potential. Thus excitation of muscle cells can lead to an action – it could be walking, moving an object etc. However, cardiac muscle cells are even more unique (than plain muscle cells) as they can contract without any external stimulation at all, and are instead driven by a specialized group of cells in the heart known as the pacemaker cells. Although each pacemaker cell can contract independently, in real life there action is closely coordinated (which is not under our conscious control) so that heart rate and ventricular output can be delivered in most efficient way to allow regulation of blood pressure and distribution of blood all over the body. [2]

To understand this phenomenon more clearly, we should first of all take a look at blood flow through the heart, and get an overview of how the cardiovascular system functions. Figure 1

HOW DO PACEMAKER CELLS GENERATE AN IMPULSE?

The pacemaker cells responsible to heart beat are concentrated on the SA node which is located in the right atrium, close to where the vena cava opens into the chamber. It can initiate the signal that triggers our heartbeat because it has a peculiar membrane potential (the charge across a cell, which depends on the flow of charged ions into and out of the cell). Normally, when an excitable cell produces an action potential, it reverts afterwards to a relaxed state whereby it returns to a relatively stable resting membrane potential until another action potential is triggered. HOWEVER! Cells in the SA node do not have a stable membrane potential, and after an action potential, it drops back down only as far as the firing level so another spike is immediately produced. [3] This is due to differences in ion flow across the cell membrane, with calcium (Ca2+) playing a much more prominent role in SA spiking, while sodium (Na+) takes a back seat. Due to this unstable membrane potential, action potentials in the SA node are self-initiating, and are not dependent on external stimulation. These spikes in the SA node lead to contraction of muscle cells in the atria, before they converge on the atrio-ventricular node, which passes the signal on to the ventricular muscle cells via the bundle of His and the Purkinje fibers. The impulse moves quickly through the muscle cells because they contain gap junctions, which join cells together and facilitate the transmission of excitation. This allows the cardiac muscle cells to function as a unit and to contract or beat as one cell.

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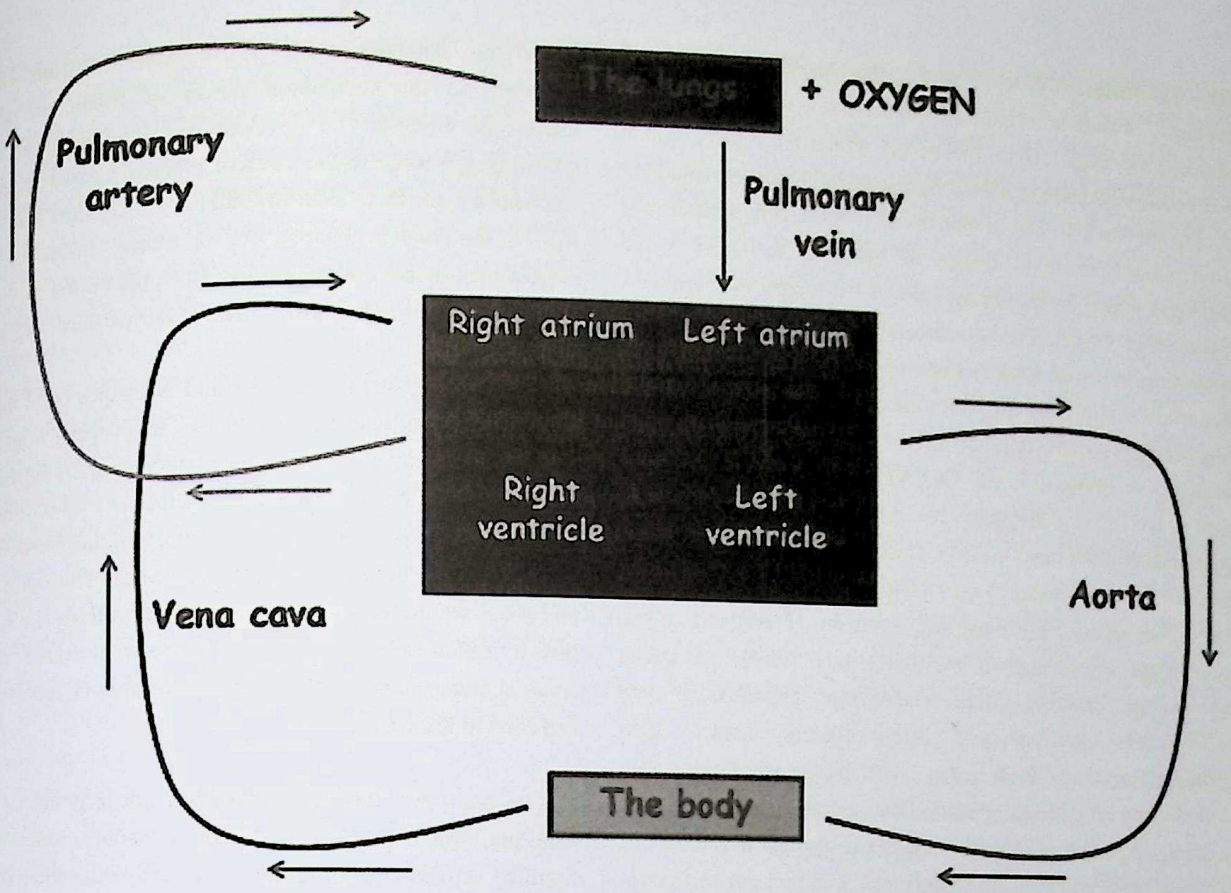


Figure 1 Circulation of blood

HUMAN BODY VERSUS COSMOS - SIMILARITIES OF ORIGIN OF LIFE (HEART BEAT) WITH ORIGIN OF UNIVERSE

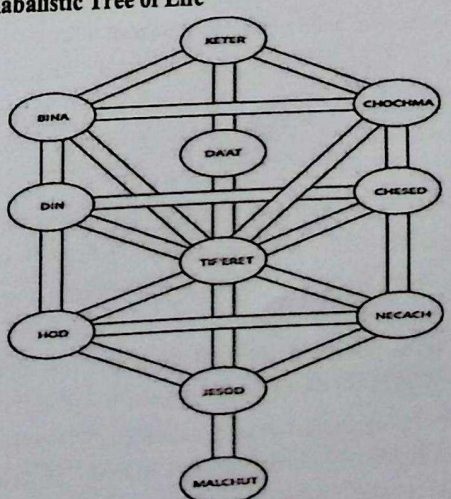
The similarity of heart as the central sun of the body has already been discussed but there are other similarities between animal body and universe and the similarity pertains to origin of universe and origin of animal life. Interestingly in the origin myths most of the religions of now philosophically converge, whether it is Vedic religion, Christianity, Kabbalah, Islamic religion or even Mayan religion. As a matter of fact Vedic philosophy is very close to Cabala concept of tree of life as I will elucidate and this whole concept finds resonance with the concept of spontaneous activity as seen pacemaker cells, a hallmark of life.

ORIGIN OF UNIVERSE – QUANTUM PHYSICS UNITES WITH VEDIC PHILOSOPHY

Indian mystic philosophy (Chakra) is very close to Jewish Sephirot (constitutingTree of Life) or orthodox Christian Qabbalah and all of them have a similar concept of creation. Figure 1 However, it is surprising that these philosophies are in resonance with the latest concepts in Quantum Physics even the Big Bang theory as we shall see below.

ONE - In almost all esoteric spiritual traditions, the Universe begins with the Oneness, It is said to have the shape of a sphere, and we shall refer to this as the Universal Sphere. In Vedic terminology it is advaitvad (Shunya), in Cabalistic terms it is Keter, and in Islamic terms it is Tawhid or oneness of God. From a purely mathematical perspective, we can think of this Sphere as a pure point, which has no "time" and "space" as we now think of it, thus both infinitely large and infinitely tiny, depending on your perspective from within it – and a point would indeed have spherical symmetry. In modern Quantum physics it can be referred as the "Absolute Physical Vacuum." Keter is the topmost of the Sephirot of the Tree of Life in Kabbalah which means "crown." This first Sefirah represents the primal stirrings of intent of God, or the arousal of desire to come forth into the varied life of being.[4]But in this sense, although it contains all the potential for content, it contains no content itself, and is therefore called 'Nothing', 'The Hidden Light', 'The air that cannot be grasped'. Being desire to bring the world into being, Keter is absolute compassion, pure consciousness, beyond all categories and timeless. As pure formless consciousness, it is often compared with the Sahasrara chakra, which resides above the crown of the head, in Indian Shakta Tantra. [4]

Figure 2 Kabalistic Tree of Life [5]



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TWO - The traditions then tell us that the Oneness then chose to divide itself. [6] This point is expressed in esoteric science as "the One divided into the Two." All of this occurs within the Sphere, which does not change its shape or form a double of itself like we would see in the division of a cell. This simple division of the energy within the Sphere created two main bodies of aether (Akasha in Vedic terminology), which for simplicity's sake we will refer to as aether 1 (A1) and aether 2 (A2). The two aethers A1 and A2 are rotating in opposite directions with slightly different frequencies (A1>.A2) but the net effect is still zero. So philosophically we can now see how nothing becomes something (although net effect is still zero) and this phenomenon is responsible for CREATION. In modern quantum physics universe is constituted by three kind of constituents: Baryonic matter (Luminous matter), Dark Matter and Dark Energy. Baryonic or luminous matter is the visible portion of matter or space-time construct within electro-magnetic spectrum or available to our sensory organs. Interestingly it constitutes only 5% of total mass-energy of the universe. Dark matter is a hypothetical type of matter distinct from baryonic matter(ordinary matter such as protons and neutrons), neutrinos and dark energy whose existence is inferred by its invisible gravitation effects and it constitutes 27% of mass-energy of universe. However, the most abundant constituent of universe is Dark Energy. (85% of universe) which is not in electro-magnetic spectrum, therefore not available to us for analysis but responsible for expansion of universe.[7, 8] Thus the great majority of ordinary matter in the universe is also unseen, since visible stars and gas inside galaxies and clusters account for less than 10% of the ordinary matter contribution to the mass-energy density of the universe. Aether is the Dark Matter (and therefore not visible to us) and formation of A1 and A2 gives rise to the concept of Dvaitvad in Veda, Chochmah in Kabbalah, yin and yang i.e a masculine property and a feminine property. However, being dark matter, none of this is visible. In Quantum physics it can be called as hot dark matter (vibrating at a higher frequency) and cold dark matter (vibrating at a lesser frequency). An important concept at this point is that A1 swirls clockwise while A2 swirls counterclockwise at the same time, and they will mostly pass right through each other in the Sphere as this movement continues. A1 bonds to itself as one spherical entity, and A2 bonds to itself as a separate spherical entity. Hence, this fluid-crystal geometric quality of A1 and A2 keeps them from blending into each other (homogenizing) all at once and losing their counter-rotating momentum and to preserve their own inner geometric order, much like an elaborate Vedic mandala pattern, while they counter-rotate. Chokhmah (Wisdom) is the uppermost of the sephirot of the right line (the "Pillar of Mercy") in the kabbalistic Tree of Life. [9] It is the second of the ten sefirot, is the first power of conscious intellect within Creation, and the first point of 'real' existence (since Keter represents emptiness). According to the book of Job, "Wisdom comes from nothingness". This point is both infinitely small, and yet encompasses the whole of being, but it remains incomprehensible until it is given shape and form in Binah. Chokhmah is associated in the soul with the power of intuitive insight, flashing lightning-like across consciousness, the power to spontaneously extract such insight from the super-conscious realm. The "wisdom" of Chokhmah also implies the ability to look deeply at some aspect of reality and abstract its conceptual essence till one succeeds in uncovering its underlying axiomatic truth. These seeds of truth can then be conveyed to the companion power of Binah for the sake of intellectual analysis and development. Chokhmah is the primary ("beginning") force in the creative process, Creativity, as it is said: "You have made them all with Chokhmah." (Psalms 104:24) The first word of the Torah in Genesis, Breishit means "In the beginning (God created the heavens and the earth)". In Hindu philosophy it represents the idea of Shiva in the Shiva-Shakti duality of Shakta Tantra.

THREE - Most of the time, A1 and A2 slip around each other as they pass. However, if their geometries are properly aligned, they can and will blend together. Electromagnetic energy is formed when the field bubbles of A1 and A2 merge together in a co-ordinated manner. Of course, electromagnetic energy is the building block of all visible physical matter, defined by equation E=MC2. Thus with initiation of this phase we get visible something out of nothing. In vedic concept this is called *trinity* of supreme divinity or three intelligences; creation, maintenance, and destruction, trinity in Christian philosophy and Bina in Kabbalah.

Let us now take this foundation and advance the next series of concepts, which operate on a fluid-dynamic model: As the two fluidlike aethers counter-rotate, they pass each other, some of their field bubbles will directly collide. When their geometric frequencies are properly aligned, the two different forms of energy of A1 and A2 merge together. Once A1 and A2 merge together, they are immediately compressed by the material that surrounds them on all sides. Similar to how a spherical bubble of air forms in water, the compression of the merged energies of A1 and A2 forms a miniature sphere. This creates a tiny replica of the Universal Sphere, a perfect microcosm of the macrocosm. Within this tiny sphere, the aetheric energies of A1 and A2 will continue to counter-rotate and swirl around each other just like they do in the Universal Sphere. This forms a vortex, which takes on a form of "gravity" by attracting A1 and A2 into itself via the Biefield-Brown effect. As these tiny spheres continue to attract more and more field bubbles from A1 and A2, they will gradually grow in size. This is not much different than adding new droplets to a spherical bubble of water and watching it expand in size. The "units" that are formed in this process form visble matter (matter in electro-magnetic spectrum) as we now think of it, via Johnson's model. Without A1 and A2 blending together, there is no observable matter. Thus from dark matter and dark energy we get Baryonic or luminous matter.

Fluid Mechanics and Formation of Universe

The first aether (A1) spins in a clockwise motion, and this causes a whirlpool to flow in through the north pole of the Sphere and out through the south pole of the Sphere. The second aether (A2) spins in a counter-clockwise motion, and this causes a whirlpool to flow in through the south pole of the Sphere and out through the north pole of the Sphere. Like all whirlpools, the movement is in giant circles, which moves faster and faster as it gets closer to the center of the vortex, where anything floating in it will get eventually crushed and submerged by the incredible pressures that are created there. Thus central vortex-axis of the sphere will have the greatest speed of movement, and also the greatest pressure. A1 pushes towards the

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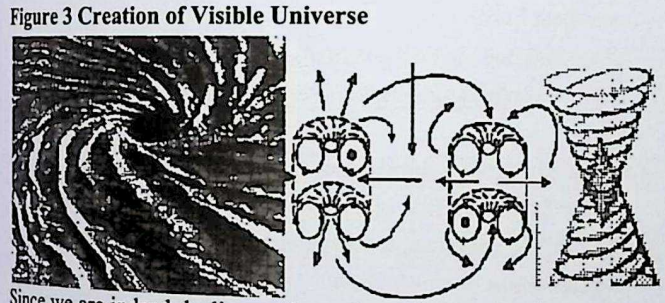
center from the North and A2 pushes towards the center from the South. They both collide in the exact center of the Universal Sphere with the greatest speed of movement and also the greatest pressure. In our modern theory of creation of universe, after A1 and A2 have formed (Chokmah) and their counter-rotational movement begins, the moment when this vortex collision first takes place in the center is what mainstream scientists would call the "Big Bang." The south-moving pressure of A1 collides with the north-moving pressure of A2, and much more of the field bubbles of A1 and A2 begin to merge together in this area than in any other. They form into the shape of a sphere in the center since there is pressure pushing in on them from all sides. Electromagnetic energy is created, according to Johnson's model of physics, forming visible light and matter (The CREATION OF VISIBLE UNIVERSE with Big Bang). This sphere of energy begins to grow at first, as it absorbs more and more of the fluidlike energy "particles" of A1 and A2 into itself. We could also think of this event as the BIRTH OF FIRST STAR in the Universe. Luminous plasma is the original, basic form that is produced as the two aethers blend together. The next image that we see below comes from the work of Dan Winter Figure 3) showing the whirlpool to the left, the torus formations in their opposing rotation in the middle and then a diagram from Dr. Walter Russell to the far right that shows how they come together and form a sphere.

Figure 3 Creation of Visible Universe



Since we are indeed dealing with a sphere that is a luminous plasma, many esoteric schools of thought refer to this Central Sphere as the "Great Central Sun."Furthermore, this is also the basis for the mystical importance of the number THREE If A1 is seen as "male" and A2 as "female," then in their "sexual" union they form an offspring that is a small image of the One, made from the material of both of its "parents." We see Trinity concepts emerge in many spiritual traditions, including the Vedic faith, the Egyptian faith and the Christian faith. This can be seen, for example, in the Egyptian myth of Osiris the father, Isis the mother and Horus the androgynous son. This is one example of how "exoteric" or non-metaphysical trinity doctrines could be shared amongst the uninitiated, while the stories cleverly concealed the deep, esoteric scientific facts with symbolism.

The next concept after CREATION - the birth and growth of the Great Central Sun is the development of a pulsating rhythm which is established in this central sphere, as follows:

- Once the luminous plasma that is forming within the central sphere reaches a certain size, the incredible surrounding pressure of the whirlpool vortex movements of A1 and A2 causes the sphere to collapse in on itself and implode.
- This implosion jams the luminous plasma together ultra-tightly.
- However, the plasma resists being compressed beyond a certain maximum level of density.
- So, just like an elastic ball would do under compression, the entire plasma sphere collectively bounces back against the surrounding pressure, causing it to explode back to its original size.
- As soon as the plasma sphere reaches its original size, the tremendous surrounding pressures cause it to implode once again.
- Since the sphere still cannot handle being compressed that tightly, it again explodes, and so the cycle continues, the sphere continually growing slightly larger each time due to the steady increase of the amount of energy streaming into it.
- Thus what develops can be called as a "central oscillator."

In this model, the main energy fields of A1 and A2 in the Universal Sphere will maintain constant, steady speeds of rotation relative to

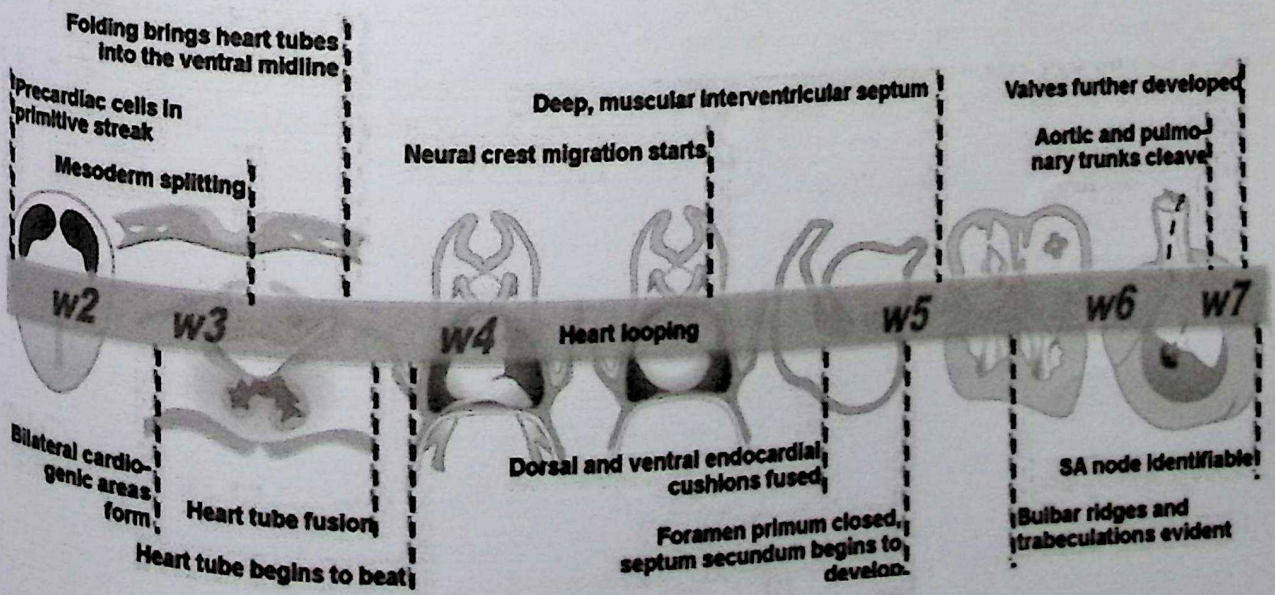


Figure 4 Embryological development of heart and blood vessels

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each other, with A1 slightly faster than A2. This also means that the implosion-explosion cycle of the central sphere will pulsate with a steady, unchanging rhythm, breathing in and out, in and out. For this reason, esoteric traditions refer to it as the "Breath of the Divine" or the "UNIVERSAL HEARTBEAT." This movement also creates many geometric patterns " Mandala" of Vedic and Buddhist traditions and geometric forms so cherished in Islamic traditions of art.

Binah is 'intuitive understanding', or 'contemplation'. It is likened to a 'palace of mirrors' that reflects the pure point of light of Chokhmah, wisdom, increasing and multiplying it in an infinite variety of ways. In this sense, it is the 'quarry', which is carved out by the light of wisdom. It is the womb, which gives shape to the Spirit of God. [10] On a psychological level, Binah is "processed wisdom," also known as deductive reasoning. It is davar mitoch davar—understanding one idea from another idea. While Chockmah is intellect that does not emanate from the rational process (it is either inspired or taught), Binah is the rational process that is innate in the person which works to develop an idea fully. Chokhma and Binah are compared to the fuel and the engine of a car. Chokhma is the fuel, pure force, and Binah is the engine, pure potential. One without the other is useless; both are needed to drive the cosmos. In its role as the ultimate Object, as opposed to Chokmah as the Subject, its role is similar to the concept of Shiv-Shakti in Ajna chakra of Indian mysticism, where both Shiva and Shakti are united; Shakti is feminine, and the animating life force, literally giving birth to the whole of creation, providing the supernal womb whereas Shiva is dead, a corpse, without her energy., In Kabalistic tradition Bina is also related to the Yoni, the womb, with Chokmah providing the raw energy. Binah is the Priestess card in the occult tarot

HUMAN HEART BEAT AS MICROCOSM OF UNIVERSAL HEARTBEAT

Many western and occidental philosophies have considered human as reflection of god. Vedic philosophies consider "atma" as a reflection / part of "parmatma." Islamic religion also considers human as a reflection of God and so does Christian religion. Thus it is not surprising that initiation of heart beat which may be considered as beginning of life for a human being represents the 'big bang," the beginning of universe and that heart beat shows same kind of automatic pulsatality which is the hallmark of central sun. This rotation and pulsatile phenomenon is evident in all life phenomenons and is part of esoteric traditions "Pranayam," dervish dances, parikrama and even rock music as well as rotation and revolution of heavenly bodies or pulsations of Pulsars. This phenomenon may be aptly called as "Rhythm of Life."

In this context another important difference between a machine and a human is that while the function of a machine happens after the structure is already established and only after structure is established, with life first the function happens and then the structure develops around it. An example of this is also seen in the development of heart where first pulsation starts circulation of blood like fluid, and where the fluid is circulation on the sides deposit the vessel cells ultimately forming the blood vessel. In other words, blood flow starts before development of blood vessel. Figure 4

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Parallel Session: Reflections on Vedānta and Science

Part – I:

Chairpersons (Hall 1): Mohan Kharel, Ph.D., *Retd. Prof. ,Central Dept. of Biotechnology, Tribhuvan University, Nepal*
&
Mrigendra Bahadur Karki, Ph.D., *Executive Director CNAS, Tribhuvan University, Nepal*

Chairpersons (Hall 2): Rajani Malla, Ph.D., *Central Dept. of Biotechnology, Tribhuvan University, Nepal*
&
Rameshwar Adhikari, Ph.D., *Executive Director, Research Centre for Applied Science and Technology (RECAST), Tribhuvan University*

Talk 1: (Hall 1)

THE OBJECTS OF PERCEPTION IN ILLUSORY EXPERIENCES

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AIM OF THE PAPER

The aim of this paper is to look at some theories of perception and examine each of these briefly in the face of the phenomenon of perceptual illusions. It will also look an attempt to classify illusions and demarcate the theoretical differences between various illusory experiences and their causes. Finally, it will also examine various approaches to the explanation of the classic Muller-Lyer illusions.

PERCEPTUAL EXPERIENCE

We transact with the external world through the processes of perceptual experience. While it comes naturally to us to see our external surroundings (we only have to open our eyes!), the mechanism underlying the resulting perceptual process is extremely complex. The visual data is processed very fast, thus, helping us cope almost immediately with the external environment.

There is a conceptual distinction to be made between immediate sensory experience, and what is generally known as ideas, beliefs, thoughts, feelings etc. The former, variously called sensations, sense-data, perception etc., are different from the latter in that they impinge on our senses with immediacy and vividness. The latter may be called our cognitive faculty, which integrates data as we gain newer experiences, and utilizes this information as background knowledge in novel perceptual experiences. The readiness of this knowledge in perceptual experiences is extremely vital for vision because retinal images are inherently ambiguous (Gregory, 1997). As we shall see, a specific kind of visual illusions arises because of this application of background knowledge to visual data.

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The fundamental units of a perceptual experience (if it may be so described) are the objects of perception. It is on the reception of these that the perceptual mechanism rolls into function. The objects of perception causally affect our perceptual system and represent the world to us.A prominent problem that the various theories of perception struggle to accommodate is the problem of explaining perceptual illusions. Illusions are aberrations in our normal way of perceiving the world. When we are under an illusion, we do see something as X. But the *X-sensation* we have does not correspond to the structure of the world. This is obviously a problem; especially for theories that argue that perception is nothing but a passive reception of perceptual data.

In illusory experiences, visual data does not fit with our conceptual scheme. We cannot un-see it, no matter how hard we try, or what we know about the actual state-of-affairs. The perceptual apparatus is not dysfunctional when we see an illusion. Therefore, it is leads us to assume that the illusions arise because our cognitive mechanisms work in peculiar ways.

Furthermore, within a scientific worldview, it is important also to look at the *cause* of the perceptual experience of an illusion. When we perceive something in experience, say X, we are disposed to think that there must be something that *exists*, which corresponds to X. This is a metaphysical leap into claiming that whatever we sense, is in some ways *caused by* some object, which carries the X-properties, which is a sensible quality. This is known as the phenomenal principle (Robinson 1994). Similarly, the perceptual information we receive counts as knowledge, or knowledge-bearing, only if they correspond to actual states-of-affairs.

There is a need to save the authority of perceptual experience in building up knowledge because it is through perception that we gain information about our immediate surroundings. Although some perceptual illusions are persistent (and this is the category of illusions that this paper is about), there is the need to categorize them as such, and separate them from veridical perceptions (a project advocated by theorists of disjunctivism in perception).

The problem of perception fundamentally turns on two characteristics, namely, the absence of an independent source of information on our own perceptual states, and the qualitative similarity of veridical perceptual experiences, and illusions. The next section explores some theories of perception and compares the status of veridical perceptions with illusory ones.

THEORIES OF PERCEPTION

a. Realism

According to French (2014), the theory of realism can be broadly classified into naïve realism and scientific realism. Naïve realism is the simple claim that the objects of perception are independent of perceivers and that the world exists independently of us. There is a relation of awareness between the perceiver and the object. The experience consists in being immediately responsive to the properties of the ordinary object. Perception is non-representational according to this theory. The properties of the object itself constitute the perceptual experience of the perceiver. The world is actively involved in forming the experience. But the individual is also involved in the sense that the specific spatiotemporal location, perspective modality, and other conditions of perspective variation play a part in forming the perceptual experience.

The most prominent form of naïve realism invokes a *formal* relation of the perceiver with the world, without giving much importance to the *content* of that experience. Even when the perceived object remains unchanging, the visual experience can still be different, because of the conditions of variations explained above.

Scientific realism on the other hand, makes the claim that some properties that we attribute to the ordinary objects are in fact dependent on their being perceived. Therefore, in the proper sense, unperceived objects shouldn't be said to have these properties.The best exposition of this distinction is found in Locke's distinction between primary and secondary qualities. In the *Essay Concerning Human Understanding*, Locke asserts that primary qualities are the inseparable properties of an object – inseparable in that the object cannot be imagined without these properties. These are shape, motion, size, solidity etc. Secondary qualities are, on the other hand, those *dispositions* that an object has in the presence of a perceiver alone- such as colour, sound, texture etc. Along these lines, the scientific realist would argue that only when the primary qualities of an object are directly perceived, can the object be said to *exist*- because the object is inseparable from these properties. However, when the properties of an object, such as its sound, colour or taste are not experienced, then there is no ground for the inference that these properties inhere in the object.

In the case of an illusory experience, the properties of the mind-independent object do not correspond with the properties that are experienced by the perceiver. If this is the case, how can one explain the presence of errors in perception?

The realist would say that perception is a function of the nature of the objects of perception. The varying conditions of the perceiver and the contexts in which the object is located together construct a perceptual experience. Thus, the bent pencil can be explained by the

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physical theory of refraction. Light travels through water in a particular way, reaches the eye, and is processed in a particular way by the visual system. This is why the pencil appears bent.

b. Sense-Data Theory

According to the sense-data theory, if a perceiver is sensibly aware of something, then there is some distinct *object* which is such that it is possible to be aware of it. This object is the sense-data. Unlike the mind-independent objects of perception in the realist theory, sense-data are *mind-dependent* entities. They bear qualities that are sensible. Against the realist, the sense-data theorist claims that the cause of any perceptual experience is this special entity- the perceiver is *directly related* to the mind-dependent sense-data. This is also the idealist position championed by Berkeley.Kant's familiar problem of the phenomena-noumena distinction can be seen as a direct consequence of assuming such a theory.

The sense-data theory creates much room for knowledge skepticism, because we are never aware of the objects themselves in perception. One way of getting around this problem is to adopt the position of the indirect realist – which claims that while we may not directly be aware of ordinary objects themselves, we are aware of them indirectly, via sense-data. Mind-dependent objects are ultimately dependent on mind-independent objects which are perceived indirectly.Sense-data are nothing but *representations of* objects in the world. This is called the *representationalist* theory of perception. However, indirect realism is also a position unacceptable to common sense, because the direct awareness of objects is still denied. We like to believe that the objects of our perceptual experience are the actual objects of the world itself and not something ontologically indeterminate. What indirect realism seems to do is create an ad hoc justification to explain our knowledge of things in the world.

The theory is untenable, because it draws a "veil of perception" that strictly separates the experiencing subject from the world being experienced. It doesn't save the theory much to say that sense-data are the "means" through which the world is experienced, as long as the theory holds direct awareness of sense-data (and indirect awareness of objects in the world) as its most fundamental premise.

Perceptual illusions raise a fundamental problem for sense-data theorists. In the case of illusions, how can sensible objects of awareness (and their properties) be experienced by an individual, without there being an object that has those properties? For the sense-data theorist, the presence of illusory experiences independently point to the fact that states-of-affairs are different from how the world *appears* to us. When I look at a white wall with yellow light projected on to it, my most immediate awareness tells me that the wall is yellow, although in fact, it is white. There is no other means of information I have recourse to, but the sense-data that I see a yellow wall.
The qualitative awareness of veridical experience is the same as the awareness of illusions. We do not have any other independent means of establishing the veracity of our perceptual experience. Thus, illusions show us, that even in the case of normal veridical perception, what we are aware of is sense data.

c. Intentionality theory

Intentionality theory is derived from Brentano's conception of the *aboutness* of the mind towards its object. This form of awareness is non-relational, unlike the sense-datum theory. The focus here is not on the formal nature of perception, but rather on the perceptual content itself. The theory hinges on the phenomenal character of an experience. Thus, we are directly aware of the representations of objects of experience, instead of being related to it via the medium of sense-datum or any other kind of an extra entity.

Like the direct realism theory, the intentionality theorist would argue thatthe world is constitutive of the phenomenal experience. The properties of the object and how the objects are related to each other in external space constitute how I perceive that object. Similarly, the perceivers mind also actively contributed to the content of perception. So perception is not merely a passive reception of information by the visual apparatus. For instance, in the duck-rabbit illusion, whether the image appears to me to be a duck, or a rabbit depends on which features of it I am focusing on. This implies that the mind actively constitutes the perceptual experience and that perception is not merely a passive activity.

The intentionality theorists would hold that veridical experiences are not different in any respect from illusory experiences. This is because veridical experiences themselves are not paradigm instances of perception of ordinary objects. Veridical experiences are representational in nature, and may merely be *occasions* for the representation of ordinary objects as they are.

How does this theory deal with the perception of illusions then? The answer is simple- the pencil appears to be bent because it is *represented* to be so. The various material conditions of the physical environment cause a certain representation which is accessed in the perceptual experience. One may note here, that the intentionality theory appears to be very close to direct realism (Crane and French, 2017).

d. Adverbialism

The adverbialists argue that perceptual awareness is a *modification* of the perceptual experience itself. To see a red rose, on this theory, is to perceive 'redly' an object which is 'rose-like'. The object is not red, but the modified-experience of the perceiver is that *of redness*. It is not a *description* of the perceptual content. Rather, the awareness itself is modified experience, corresponding with properties that

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are caused by the object of perception. The locus of the experience, which is the perceiver, is established indubitably – because there is the perceptual awareness itself.

The only assumptions that the theory has to make are subjects, the experiences themselves and the ways in which those experiences are modified. Perceptual experience is nothing but a mental event, and the phenomenal character of that experience is nothing but a sum of the properties of that event. This property is intrinsic to the perceptual experience itself. It is neither representational, nor related in the way sense data is explained to be. The subject can consciously access the content of the experience, and thus, the experience is phenomenal in character. This view was held by Ducasse (1942) and Chisholm (1957).

In the adverbialist theory, like the intentionality theory, veridical experiences would have no special status over illusory experiences. At most, the adverbialist could argue for something like a *passing* of illusions, when perceptual conditions become better or simply, when they change. The question of the veracity of any perceptual event would not arise in the first place, because there is nothing like a correspondence theory of truth here. There is no independent state-of-affairs, separate from the modified experience itself. The most prominent example of this comes from the Indian Philosophy tradition, in the snake-rope illusion. The rope affects the subject as a snake, and even causes real emotions of fear in them. However, on getting closer to the object, the subject realizes that the experience is a super-imposition of an illusory object on a *real* one. This doesn't mean that the prior experience of the snake in the rope is undone- the snake-experience is as real as the rope-experience. How else could the former create a real sense of fear in the subject?

CLASSIFYING ILLUSIONS

Gregory (1997) argues that classifying illusions help us understand their nature and causes better. While it is extremely difficult to draw up categories of illusions, the theoretical necessity of doing this is indispensable. Many illusions elicit similar kinds of distortions in perception (like distortions of length and curvature), but have very different causes. Thus, the classification requires experimental evidence for us to ascertain which illusion falls under which category.

Gregory proposes two broad categories of illusions – those with a physical cause, and those that arise out of the misapplication of background knowledge to visual data. Thisis further divided into the four categories of ambiguity, distortion, paradox and fiction. In the physical illusions, he mentions the optical conditions that grounds the illusion, and the optical signals received at the retina. There are physical in nature, in that their cause lies in the receiving of visual data from an external object, at the retina. In the second category of illusions arising from misapplication of knowledge, the cause of the illusion lies in the processing of the visual data received at the retina, in the light of the background information. This information is used by the perceiver to make unconscious inferences about the visual data received. When the visual data does not *fit in* with the conceptual background of the perceiver, the resulting conflict leads to the perceived illusion. The visual data flouts the rules of processing that generally works fine in the cases of veridical perception.[17]

Table 2. *Illusions classified by appearances and causes*

	physics		knowledge	
kinds	optics	signals	rules	objects
ambiguity	1 mist	5 retinal rivalry	9 figure-ground	13 hollow face
distortion	2 mirage	6 Café wall	10 Muller - Lyer	14 size–weight
paradox	3 looking-glass	7 rotating spiral	11 Penrose triangle	15 Magritte mirror
fiction	4 rainbow	8 after-images	12 Kanizsa triangle	16 faces in the fire

Table source: Gregory, Richard L. "Knowledge in perception and illusion." *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 352.1358 (1997)

To take one example, in the Kanizsa triangle, the black angular lines appear to form the contours of a lined triangle, occluded by a white solid triangle. The illusion arises partly from the sharp distinction in contrast between the black pac-mans and the white angular cuts on them. Another thing to notice is that the white triangular space appears brighter than the rest of the sheet of paper, due to the computation of the overall context within which the space is set. The apparent contour of the white triangle, which is not delineated, appears also to occlude a black-lined triangle, which again is an illusory figure. The image clearly shows the application (or

[17]Gregory, Richard L. "Knowledge in perception and illusion." *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 352.1358 (1997): 1121-1127.

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misapplication) of knowledge to a sense-data that clearly does not correspond to the conceptual scheme of the perceiver, thus leading to a perceptual illusion.

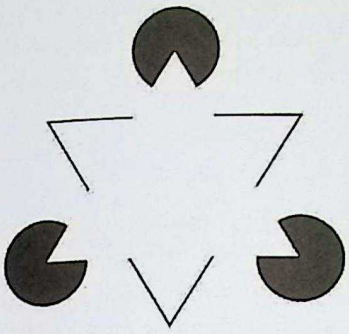


Image source: https://www.futilitycloset.com/2006/06/24/kanizsa-triangle/

THEORIES ON THE MUELLER LYER ILLUSION

The Muller Lyer (ML henceforth) Illusion is a classic case of a perceptual illusion that has led to much research into the cause and possible explanations of why it appears. The strength of the illusion lies in its simplicity and strong persistence. Although there are many versions of the lines that have been used to explain and dissolve the illusion, the most basic one is this:

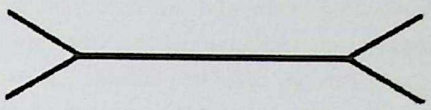
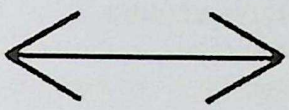
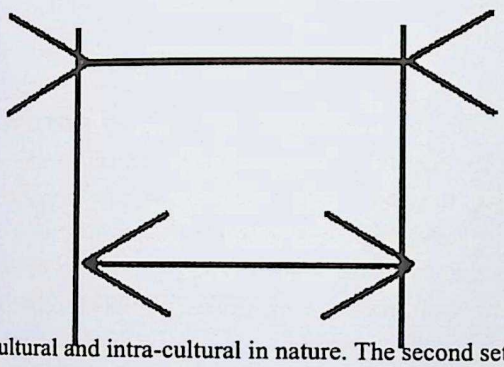


Image Source: https://plato.stanford.edu/entries/modularity-mind/

The ML illusion is the appearance of the upper line as being longer than the lower line, although the lengths of both the lines are exactly equal. The illusion dissolves when we draw a vertical line along the end-points of the two horizontal lines like this:





However, without the length cues given by the vertical lines, it appears quite difficult for a lot of people to see the lines as being of the same length. However, there have been numerous case studies that report the non-influence of the illusion on various communities, or disparities in how the illusion is experienced, suggesting, that the ML illusion is not universal in nature. These studies attempt to map the susceptibility of perceivers to the illusion across cultures, between various age groups within a culture, between men and women etc.A few of these studies and their central observations are mentioned below. The first set of studies is cross-cultural and intra-cultural in nature. The second set of studies focus of the cognitive apparatus of perception, and tries to explain illusions in the light of this.

CULTURAL STUDIES

a. Object structure of environments

Studies were conducted on susceptibility of people dwelling in urban areas and rural areas to the ML illusion. It was observed the Americans and Europeans, who are acclimatized to rectangular buildings, right-angled doors, rooms and corridors, right-angled streets etc., are more susceptible to the ML illusion than people from other parts of the world. These "carpentered" environments shape the perceptual mechanisms in peculiar ways (Campbell, Herskovits, Segall,1963). Winter (1964) studied the effect of the illusion on Kalahari Bushmen and found that they were remarkably less susceptible to the illusion. As opposed to African laborers, laboratory workers and white populations, the Bushmen could perceive the size of the lines as they are accurately.This was ascribed to the fact that Bushmen live in environments where right-angled objects are scarce and their environments consist of open vistas, unlike clustered urban settlements.

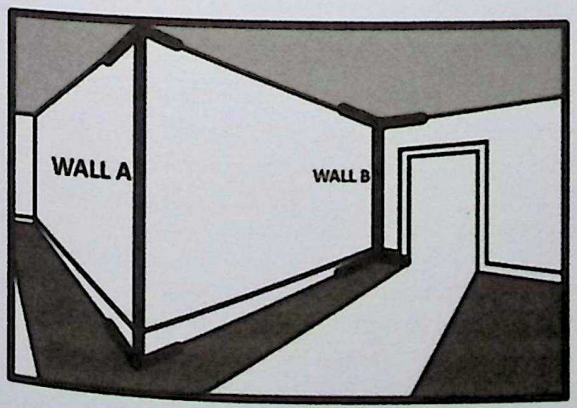


Image source: http://ideate.xsead.cmu.edu/gallery/projects/muller-lyer-illution

Image source: https://africanecotravel.files.wordpress.com/2010/10/bushmen21.jpg

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A study conducted by Ahluwalia (1978) on children and adolescents in Zambia, showed the general inadequacy of the cross-cultural studiesmentioned above. In this case study, the participants were two categories of children, both between the age group of 8-19, with similar educational aptitude. The difference was that one category lived in a "carpentered" environment and the other did not. There were two versions of the M-L illusions that were presented to them – one, the conventional pair of M-L lines, and the second, with perspective cues. Both groups showed similar kinds of susceptibility to the ML illusions.

b. Retinal Pigmentation

Similarly, Jahoda argued that members of the same country settled in urban and rural areas showed no significant difference in responding to the M-L lines. His experimental studies were conducted in Ghana and Britain (Jahoda, 1966). He suggested that the differing perception of the M-L illusion could be attributed to the differences in retinal pigmentation (Jahoda, 1971). It was later verified that this theory could be plausible because people with darker skin have denser eye-pigmentation, which explains the cross-racial, (and not necessarily cross-cultural alone) disparities in the response to the M-L lines.

COGNITIVE STUDIES

Other explanations for why the ML illusion is experienced are cognitive in nature, and therefore attempts to look at the cognitive mechanisms that are involved in how the illusion is perceived. These studies bring into light the more universal features of our cognitive processing, and understanding these mechanisms gives us better insight into the workings of the brain. The three prominent theories are as follows:

a. Misapplied size constancy scaling – Gregory

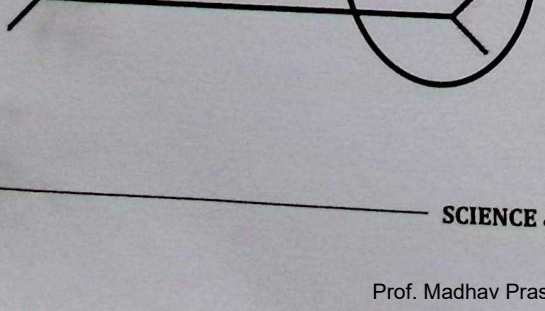
According to this theory, the illusion is experienced because the two lines present depth cues to the perceiver (Gregory 1997). The illusion arises due to the misperception of the lines as being differently located from the perceiver. The perceptual mechanism of size constancy gives the perceiver the illusion that the shorter line must be farther away than the longer line (because under normal conditions, things approaching closer *appear* to increase in size, although they are not actually perceived that way). The arrowheads give the appearance of three dimensionality to a two dimensional image, which confuses the perceptual system. The computation of this (adjusted) information further affects the perceived relative sizes, and thus, the two lines are perceived to have different lengths(Woloszyn, 2010).

This view has been widely contested by theorists who have presented multiple variations of the Muller-Lyer lines. For instance, in a three dimensional version of ML illusion, (Stacey and Pike, 1970; McGraw and Stanford, 1994), the illusion is somewhat nullified. Similarly, when dots are used instead of lines or explicit three dimensional cues are provided, or when the stimulus is examined by touch, the illusion is not as strong as the classic ML illusion. When the haptic plus visual information is perceived, the illusion is greatly diminished. This indicates that there must be more than one mechanism that is employed in the perception of the illusion, and that these other mechanisms need not be necessarily visual.

These cases do not provide a strong argument against the classic ML illusion. In studies of this nature, the conditions under which the lines are perceived is changed, and thus, they do not explain the persistence of the classic ML illusion. Gregory's theory is considered as a popular theory, because it makes use of the general depth perception mechanism to explain the illusion.

b. Conflicting cues, or combined contextual perception

This theory claims that the ML illusion is experienced because the visual system takes into account the *overall length* of the two lines, and then computes the length based on the total information (i.e., visual data including the inward and outward turned arrows). The perceived spatial location of an object and its relation to other objects is determined by the position of the centroid (centers-of-masses) of the image, within the context of the surrounding visual signals.In M-L illusion, the pattern of neural excitation evoked by the wings (the contextual flank), overlaps the neural excitations caused by the extreme edge of the wings (which is the stimulus terminator).



The stimulus terminators of the upper and lower lines end in different spatial locations. Thus, the displacement or the uneven terminating points of both the lines – which is calculated as a whole in the computation of the visual object – leads to the illusion that the lower line is longer.

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This leads to the perceptual displacement of the stimulus terminator, due to the shift of the centroid of the overlapping neural excitation. The dynamic ML illusion[18](in which the arrowheads move and the lines appear to stretch like a rubber band) makes this evident which is particularly intensified, when the gaze if fixed on one of the terminating arrowheads.

The relative displacement of all stimulus terminators leads to misjudgment of distances between them; that is, the illusion occurs as a side effect due to necessarily low spatial resolution of the neural mechanism of assessment of the relative location of the visual objects. The ensuing neural computation affects the judgments of distance between visual objects (Whitaker et al., 1996).

This integration reduces the efficiency of the visual system to determine the mutual positions of image elements accurately. It coarsens the sharpness of the position of the object that is visualized. However, this spatial pooling of the positional signals is biologically substantiated, because it allows fast and reliable assessment of the location of the visual objects as a whole – irrespective of its size, shape complexity and illumination conditions.

Through the example of the two explanatory theories mentioned above, we observe that the experience of the specific class of perceptual illusions (illusions arising from misapplication of background knowledge) is

KNOWLEDGE OF THE WORLD – HYPOTHESIS GENERATOR

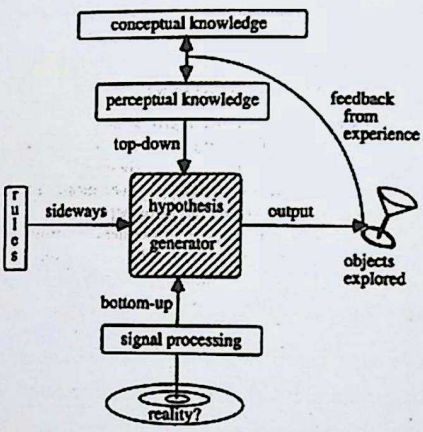

Image source: Gregory, Richard L. "Knowledge in perception and illusion." *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 352.1358 (1997): 1121-1127.

The perceptual system is a two-way machine that integrates sensory data with background knowledge acquired through previous experiences and conceptual knowledge. The cognitive and perceptual systems are also designed by a shared evolutionary human history, which makes it a custom made machine for problem-solving. The diagram (Gregory, 1997) gives a picture of the perceptual process. As Hermann von Helmholtz put it, the visual system is like an inference machine that whirs without our conscious control of it. It is equivalent to the hypothesis generator shown above, which combines input sensory data with conceptual and perceptual knowledge. The horizontal arrow represents the rules of computation, which determines which information is to be processed how.

In this complicated mechanism, perceptual error arises when sensory data comes packaged in ways that conflict with the conceptual expectations of the perceiver. These expectations could be a function of the context of a perceived object, the psychological constancy (size, shape) mechanisms, or cultural bi-products of living in certain environments. When such conflicts arise, we experience perceptual illusions. The presence of illusions does not necessarily mean that our visual apparatus if faulty. Rather, illusory experiences give us wonderful insights into how the brain functions in typical and atypical conditions.

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Talk 1: (Hall 2)

The Modern "Self"

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One of the most difficult and yet *urgent* inquires are those where we *come across* questions pertaining to the nature of self and its existential structures.[19] The term *structure* or *nature* can be understood in many interrelated ways. I will use it synonymously with the *structure or nature* which itself shapes the human experience. I don't know answer to any of these questions, but will talk of two approaches amongst many.

Firstly, I will present an *Advaita* approach to this question with special reference to the *Bṛhadāraṇyakopaniṣat*. I will examine the Advaita views on the nature of the self. I also do not wish to contradict or question any of the Advaita premises or conclusions regarding self and its nature, but rather we ought to ask for *more*. The difficulty, I claim here, is not in *knowing* the self and but the in the realization/actualization of these principles.

The *second* half of the paper presents another approach commonly called the *computational* approach to mind/self. I will only discuss a present day version of it, popularly known as, *Artificial Intelligence method* (A.I) with special reference to the cutting edge technology namely: Machine Learning. Such an approach has never been, overtly, presented by its practitioners *as* quest to know the self and its nature, but has been spoken of by many as an important advance in Machine Intelligence.[20] This approach *too* suffers from its own difficulties which spring from its very own analytical framework. And finally, some of the important observations made in middle of all these developments.

Part 1: *The self and the Bṛhadāraṇyakopaniṣat*

The question before us is: what is self? I will talk about the *self*, primarily in the light of *Bṛhadāraṇyakopaniṣat*. The sacred BṛhadāraṇyakopaniṢat is constituted of three *Kāṇḍa*: *Madhu-Kāṇḍa*, *Yajnavalkya-Kanda* and *Khila-Kāṇḍa*. I will confine myself to Section 2, Section 3, Section 4 of the *Bṛhadāraṇyakopaniṣat*. The chief aim of all Upanishadic teachings is focused around the notion of self. To put it very crudely it tells us that the entire cosmos breathes in us. Reality/Truth/*Self* is Non Dual.[21]

The main theme, here, therefore is that of transformation of individual self into cosmic self. This journey of transformation is very much like ordinary journeys of life in a *certain* sense. Just as a by passing years in school and then by training into medicine, that one transforms to a doctor, in similar fashion Upanishad tells us how to transform individual or limited self into cosmic self. The transformation is not at physical level but the transformation is at the level of thought, emotion (mental level and not at physical or biological level). When one mentally transforms, how one sees the world, the cosmos other beings are related with him which is of identity/similarity. In the above example, notice how it is the same person, who went through different stream of consciousness to finally attain the 'doctor's consciousness' (All responsibilities, character and skills of a doctor). In the same way, Upanishads tells us how to transform oneself into a cosmic being by the realizing the true nature of the oneself (*ātman*).

Importance of knowing the Self and its nature.

The story of Yājñavalkya and his consort Maitreyī is recorded in beginning of section 4, B□hadāra□yakopani□at. Yājñavalkya finding

[19] Or modes of existence

[20] I will discuss the idea in some detail in part 2 of my essay,

[21] This is the very literal meaning of the term "Advaita". Though as a *general* definition, it serves as best.

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his wife Maitreyī fit as a student tells her the only means of Immortality.[22] Yājñavalkya explains how the self is the supreme love object. He explains how the husband loves wife not for the sake of anybody but for his own 'self' etc (*ātmanas tu kāmāya*). Therefore, the self must be made the supreme object of inquiry. The self is deare than the son, daughter, husband, wife or any other relation. By virtue of being so dear to us, it must be heard of, reflected upon, meditated upon.(*śrotavyo mantavyo nididhyāsitavyaḥ*)[23].

The essence of the self is pure intelligence. The argument given is as follows[24]

Premise 1: If a thing cannot be percieved apart from something else, then the latter is the essence of the thing.

Explanation: Just as various notes only have existence by being part of the a general note and cannot said to have existence apart from the whole of which it is a part (Holism). In the same manner, this existence principle runs in all of us. A cosmic thread unites us.

The Shruti gives us more examples of such metaphysical holism. When a lump of salt is dissolved in water, whichever part one tastes, it is salty, in the same way the essence of the self as god. The knowledge is the realization of the cosmic principle of *identity* of the individual being with the cosmic being.

Premise 2: Self cannot be percieved apart from pure intelligence
Therefore, Essence of the self is pure intelligence.

Madhu vidya

Madhu vidya, loosely translated as "The Honey Doctrine" is explained in section 5, 1-13 of the B□hadāra□yakopani□at. It talks about the relation of man (self) with everything else. For example, The self, Earth, Water, Ether, Fire, Dharma, Truth all are mutually dependent on each other. The self is the essence of earth an earth is the essence of self. Moreover, *Shruti* tells us that everything is identical with *tejomayo'mṛtamayaḥ puruṣaḥ* (The Luminous Immortal Being). Everything is interconnected by virtue of a unifying consciousness which is the essence of everything. This self by virtue of being identical 'The Self' shares its essence viz. *Satcitānanda.* This is some sort of Holism.[25]

Nature of self is *ānandam*

At this juncture, I want to talk about another essential aspect of the self as told by *ānanda-mīmāṃsā.* Once there lived a king who fell ill. The problem was that he was not happy. His ministers suggested organizing various kinds of entertaining theaters, sports-fests, but the king refused by saying that none of these programs please him anymore. Once a wise Brahmin came and suggested that what is required is that the king should wear a happy man's shirt. The King then asked his soldiers to go out and search for the happy man's shirt. The soldiers then went to the richest merchant of his kingdom. After enquiring the merchant told them that he will be happy the day everyone in this kingdom starts wearing his merchandise. Similarly, they went to the most powerful man of the kingdom but came to the conclusion that almost everybody wants to achieve more and is thereby, not happy. At last they found a man who was not rich, but claimed to be happy. To everybody's surprise he had no shirts at all with him. After repeated enquiry the man told the king secret to happiness. Happiness is in realizing the nature of self is itself bliss (*ānandam*). The form/nature of self is bliss (*ānanda- svarupa*). Immense joy befell upon one who contemplates upon the non duality of the self and its true nature: *Satcitānanda.*

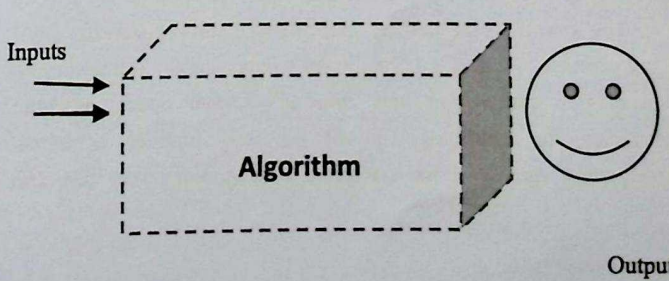
Difficulties

Without contradicting any of this, I want to push the enquiry a little further. All this is ok or might be true, but our purpose is yet not fulfilled; if one is hardly able actually *experience* the 'non duality'. Surely one must admit that *knowing* the Advaita (non-duality) is not identical with *experiencing* the Advaita (non duality). After all, *knowing* that p is not synonymous with *experiencing* p.[26] The question here to be asked is: what if our *experience* itself becomes *non dual*? Let us assume for the sake of an argument that indeed the self is one without a second[27]. Does this change the anything? Surely it does, but not at the deepest of the levels. Knowledge falls short of experience, and sometimes is "undermined" by it. One can infer that space and time bends, but such warp is not a part of human experience of space and time.[28] Perhaps the best answer to why our experience is constituted the way it is, would be that it largely determined by mental *model* that we posses.. Thus questions relating with the self and its nature inevitably leads us to understand the inner workings of the human mind.

Part 2 : A *Computationalist* approach

A computationalist approach is, loosely, one where mind is posited as an inference engine which represents the world in an intelligent manner. In short, the mind is the principle/algorithm/model that organizes the data presented to us in the form *input/inputs.* The algorithm then *extracts* out an output (pattern) from the data. The following approach thus requires only 3 kinds of entities: Input, output and algorithm.

To represent this diagrammatically:



[22] 2.4. 4, Bṛhadāraṇyakopaniṣat, translated by: Swami Madhavananda
[23] 2.4. 5, Bṛhadāraṇyakopaniṣat, translated by: Swami Madhavananda
[24] Shankara's commentary, 2.4. 10, Bṛhadāraṇyakopaniṣat, translated by: Swami Madhavananda
[25] Ōm pūrṇam adah, pūrṇam idam, pūrṇāt pūrṇam udacyate;
pūrṇasya pūrṇam ādāya pūrṇam evāvasisyate.
Ōm Śāntih! Śāntih! Śāntih!
That is Full; this is full. From the Full does the Full proceed.
After the coming of the Full from the full, the Full alone remains.
Om. Peace! Peace! Peace!

[26] Here the strong sense of the term experience is meant. Is it possible ? Vedantins experience of *non duality* is never always spoken of experience in this manner. Still I do not see any reason use the weak/loose sense of the term experience.
[27] Chandogya Up. Chap 6, 2.1.
[28] This is a one of the most discussed implications or interpretations of the conclusions arrived at in his General theory of relativity.

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The power of the human mind (algorithm) lies in its capacity and to extract meaningful patterns in the input data. All this is implemented by an extremely sophisticated hardware which we call the human brain. Below is a comparison table of the human brain with present day data processing technology.

	Supercomputer	Human Brain
Computational Units	10^4 CPUs, 10^{12} transistors	10^{11} neurons
Storage	10^{14} bits RAM, 10^{15} bits disk	10^{11} neurons, 10^{14} synapses
Operations/sec	10^{15}	10^{17}
Cycles time	10^{-9} sec	10^{-3} sec

Source: Artificial Intelligence: A modern Approach.

Even the most sophisticated of hardware today are *yet* not as powerful as the human brain itself, at least in terms of processing units.[29]

Machine learning paradigm

Now I shall delve a bit more into the state-of-the-art technology: *Machine learning (M.L)* approach to intelligence. The state-of-the-art M.L technology must be contrasted with the traditional *Knowledge based System* approach. One of the chief differences is that the KBS technology was *shallow.* In other words, the KBS's were programmed to solve only specific tasks; a slight modification in the circumstances would require reprogramming the whole system from scratch. This often required the instructions to be explicitly fed into the system which was often difficult and tedious. Moreover, their knowledge was fixed; as it was not designed learn from its mistake. In contrast, the learning paradigm is *deep* in that it learns by iterating over the tasks, to learning from mistakes by minimizing the error, and that too without any human intervention at all, henceforth the name *deep learning*. It is needless to say that the present day (M.L) technology owes a lot to Big Data and fast processors (G.P.U's). The present day *consumer* application of deep learning involve *computer vision, understanding images, Speech recognition, hand written digit recognition* etc.

The network's inner working involve is simply to take any input as training examples and then finding model (function) that best maps the input with the output. To put it crudely, the network basically generalizes from the training set and makes predictions for the test set. The learning here can be: Supervised Learning (labeled data), Unsupervised learning (unlabelled data) and Reinforcement Learning. I cannot get here into any further details anymore. However, the technology is not yet fully matured as human intelligence itself. But the discipline is progressing very fast. So, what are we heading for? Super Intelligence and the singularity hypothesis

Without any further ado, I want to present the following thought noted by various philosophers of technology, futurists, scientists, logicians, computer scientists many more (von Neumann, I.J Good, Kurzweil). To quote Stainlaw in his conversations with Von Neumann:

"One conversation centered on the ever accelerating progress of technology and changes in the mode of human life, which gives the appearance of approaching some essential singularity in the history of the race beyond which human affairs, as we know them, could not continue." 1

The singularity is here talked about is Technological Singularity: A point in the future of human race where the technology will be sophisticated enough to help or rather will be an indistinguishable part of the post-human stage (a race beyond-human). But what is technology? The term technology is used in a precise manner here. Technology is something which is designed in order to achieve some desired end. In this manner, technology is a mere means to some desired end. But mot all means are to be considered technological1. The singularity is mainly about acquiring the best of the technology capable to the transform the human experience altogether. Also, technology at that point won't be a mere means to some end, but will rather be rather an inseparable part of our lives. In some sense, the role technology will be to boost human capacities to achieve liberation in its full blooded sense and bringing us closer to what we are.

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[29] I will touch upon this point later only. I think that this aspect (the hardware) is one which cannot be ignored and is certainly the one of the most important. Recent advances in *Machine Learning and Data Science* owe a lot to increased computing powers (GPU's and TPU's).

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Talk 2: (Hall 1)

Theory of Procreation in Vedic Literature: A Quantum Field Theoretic Model

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Abstract

With a view to looking for a unified theory of the origin of both animate and inanimate objects in the Universe out of the same stuff at the primordial stage, the meanings of certain verses in *Vedas* and in *Srimad-bhagvad-Gita* are re-analyzed. In particular, attempts are made here to find some plausible explanation(s) of the verses with reference to the origin, existence and survival of objects in the same, subtlest possible cosmic consciousness field (called '*Sristi*' in Vedic science and denoted here by Φ_{cc}). For this purpose, analogies from physics, such as that of the concepts of fields, particles, holes, quanta of interactions, second quantization, etc. are freely used. With regard to the description of individual Self in terms of essences of life, a philosophical atom-like model (called 'patomic' model) of a human Being, proposed earlier by the author (Kaushal, 1994)), is considered. The roles of other epi-fields like the fields of cosmic desire, cosmic intelligence, cosmic mind along with the field of five cosmic elements (*panca mahābhutas*), present already in Φ_{cc} in their primordial forms, are also considered. Studies clearly reveal the concepts of many Universes and higher dimensions prevailing in modern grand unified field theories of physics.

Keywords: cosmic consciousness field, patomic model, quantum field theory, dressing rules.

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1. Introduction

According to Galileo Galilei, "all truths are easy to understand once they are discovered; the point is to discover them". Discovery does not mean to create a fresh, rather to find and establish a logical and scientific explanation, often at a fundamental (or subtle) level, for the already existing well perceived concept or phenomenon in Nature, as was the case with the discovery of the law of gravitation by Issac Newton.

The philosophy of Vedanta and Srimad Bhagavad-Gita (SMBG) constitutes the science of the Self (kaushal, 2011; Kaushal, 2015). It is already full of explanations of many facts and subtle aspects pertaining to an individual's behavior and experiences. The latter are well perceived by seers of all time and cultures. In fact, these truths, described by Lord Krishna in SMBG are derived from earlier Vedic texts as per His doctrines. Now time has come to find a logical and consistent explanation of many of these ever-green truths in modern scientific terms. This will enable the grasp of these concepts by a scientific mind better. While some such attempts are already made by the author recently (Kaushal,2011; Kaushal, 2015), further strengthening of these studies in the language of modern physics is still desirable.

Note that these developments in the 'subjective' science of the self, in any case, are not in contradiction with the existing well tested concepts and laws of modern ('objective') science. They are rather supplementary to the understanding of Nature in totality. At times they also offer (Schrodinger, 1944; Schrodinger, 1964, Stapp, 2009) a deeper basis for the development of modern science, particularly after noting the limitations of the latter (Weisskopf, 1977; Also see, (Kaushal, 2011), Chapter 6).

Earlier the author (Kaushal, 1994) has tried to describe the philosophy of SMBG in terms of the so-called 'patomic' (philosophical atom type) model of human Being (b) in which essences of life (EOLs), namely the worldly objects (WO), biological body (B), senses responsible for knowledge and action (SE), mind (M), intellect (I), ego (E) and finally the soul (SO) are arranged (Kaushal, 1994) in a particular fashion and grouped as $G = \{WO, B, SE\}$, $M = \{M, I, E\}$ and $C = \{SO\}$, where G, M , C correspond to gross, micro and causal bodies of the Being as per philosophy of SMBG. Here, the Being (the 'life principle'), $b \equiv CUMUG$, is the composition of all the three. Further a great deal of human (and also of nonhuman) behavior, actions and experiences has been studied [1] as the outcome of the interplay of these EOLs. . Such a human Being b is placed and works in the field of five cosmic elements (*panca mahabhutas* (PMs)), namely earth (E_a), water (W), air (A), fire (F) and ether (E_t). In fact, E_a, W, A, F and E_t, respectively stand for all solids, liquids, gases, plasmon states and the all space in the Universe. Before proceeding further a few remarks about the use and the role of an analogy in the development of these concepts are in order:

No doubt the above schematic patomic model of human Being is the outcome of some kind of analogy between modern physics and the concepts of Vedic science, but note that this analogy is of the finest order (Kaushal, 2003). In the present work, we plan to use analogy in both

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ways i.e., from physics to Vedic science and the vice-versa in order to analyze and understand the ultimate truth in the science of the Self better. The use of analogy in fact is classified in four possible major ways (Kaushal, 2003), namely from known to known, known to unknown, unknown to known and unknown to unknown. Further note that the quality of analogy used from known to unknown situations varies with the level of understanding (or the development of faculties of understanding (FOUs)) of an individual user. In search of truth in Nature this understanding goes up to the level of Yogi-category (Kaushal, 2011) of persons. Thus, in the domain of physics-philosophy interface or of psychophysics, at times we shall frequently use analogies and their interplay, which, in turn, will make the subject matter more transparent.

In the next section we present some preliminaries of modern physics, particularly from the areas of quantum field theory and astroparticle physics. In Sect.3, some glimpses of Vedic concepts pertaining to *Virāta Purusa*, the Grand Creation ('*Sristi*'), origin of Universe(s) etc. are given from Vedas and SMBG. The limits on the viability of physical laws with regard to understanding Nature in totality are already emphasized earlier (cf. Chapter 6 of (Kaushal, 2011); Weisskopf, 1977)). As to how the Vedic concepts take over the modern science in explaining some intricate concepts is presented in Sect.4. In particular, we present here a field theoretic picture of the Grand Creation via cosmic consciousness field and thereby discuss the dressing (or undressing) rules of EOLs including that of PMs with consciousness. This, in turn, provides an explanation of the concepts of multiple Universes and higher dimensions prevailing in modern physical theories. Several other aspects of study within the present frame work are briefly highlighted in Sect. 5. In Sect.6, we discuss the concepts of spontaneous symmetry breaking and Higgs mechanism of physics with reference to the cosmic consciousness field and explore the possibility of generation of epi-fields in it. Finally, concluding remarks are made in Sect. 7.

2. Some Preliminaries of Modern Physical Theories

In physics space-time mediated four fundamental interactions, namely strong, electromagnetic, weak and gravitational have been studied rather elegantly through their 'field' character. These interactions are characterized by their range and strength. While strong and weak interactions are of finite range and active mostly in the nuclear domain, electromagnetic and gravitational are of infinite range and are spread all over the Universe. With regard to their strength, at a finer level it depends on the energy scale used. Further, it has become possible to bring down the first three interactions to the same strength at the energies of the order of 10^{15} GeV and for this purpose the grand unified theories have been developed. On the other hand, the finest possible gravitational interaction is accommodated in the theory just by bringing a modification in the geometry or in the space time structure of Nature in philosophical terms up to the distance of the order of 10^{-33} cm. Whether it is the question of studying the behavior of coupling strength or spatiotemporal distance (towards the modification of geometry), in either case two entities (physical particles in case of strong, electromagnetic and weak interactions or the geometrical points in the gravitational case) are considered. With these concepts, no doubt, the theoretical predictions beautifully conform to the experiments but the fact is that the theoretical analysis is always focused around the relative aspects between the entities. For absolute studies, however, the concept of 'field', in which the number of particles (or the degrees of freedom) or of geometrical points becomes infinite, has been introduced.

Basically the physical field is considered as a continuum, all-pervading medium, consisting of the above infinite number of entities and described by the so-called 'field variable' $\phi(x,t)$ —a measure of displacement of particle at position x and time t. Not only this, the 'method of second quantization' (the first being the quantization of dynamical variables as considered in the standard quantum mechanics) turns out to an important mathematical tool to study the continuum of the field once again as an infinite system of discrete (granular) entities. Each of these discrete entities so obtained (called field quantum), in fact, carries all the basic properties of the associated field. For this purpose, there are different types of quantization schemes that have been used in the past (see, for example, (Kaku, 1993); Itzykson and Zuber, 1986)). However, we shall work in the spirit of the most convenient one that is the canonical quantization in which the quantized entity turns out to be a harmonic oscillator. In this case, one writes the field variable as the combination of two terms—corresponding to particle-antiparticle (or 'particle-hole') description of the system in view of the Dirac concept of negative energy. This in turn introduces the concept of creation-annihilation operators in the description.

In brief, such concepts of quantum field theory of physics will be freely used in an analogous manner to analyse the deep rooted concepts of Vedic science with reference to the Grand Creation at the primordial level of the so-called 'GOD' (which can appropriately be considered as an abbreviation of His qualities like 'generator', 'organizer' and 'destroyer') —a universally accepted concept in all cultures of the world.

3. Some Vedic Concepts About the Creator and the Grand Creation at the Primordial Stage

A lot has been said in Vedic literature about the Creator, the Grand Creation (*Sristi*) and their role and interplay in the origin of both animate and inanimate objects at the primordial stage. Here, however, we cite only a few Verses from Vedas [1] and SMBG which are relevant to our further analysis and the development of the concepts.

Note the following verses from Rigveda:

Iyam visrastiryata ā babhuva yadiv ā dadhe yadi vā na |

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Yo asyādhya ksah parame vyomantso amga veda yadi vā na veda ‖ (1)
(Rigveda, Mandal 10, Sutra 129, Mantra 7)

"O (Anga) Man! know only him and not any other who is creator, sustainer and destroyer and also responsible for enlightening this multifaceted, all-pervading Creation ('*Sristi*' derived from the word '*Srajana*') in which the entire Universe (or Universes) also constantly undergo creation, sustenance and destruction".

Tama āsittamasā gulamagre-apraketam salilam servmā itam |
Tucchayenābhovapihitam yadāsittapasastan mahinā jāyateikam ‖ (Rigveda) (2)

"Prior to Creation, this entire Universe in its micro but ether-like form was completely dark, neglected, not even knowable during darkness and was locally embedded in the Creation",

And the another one from Yajurveda

Purusa-aeveda & sarra yadbhutam yacca bhāvyam |
Utāmratatva syesāno yadannenātirohati ‖ (Yajurveda, Ch.3) (3)

"O man, one who is present in all in totality, imperishable, Master of all Beings and who is beyond the concept of animate and inanimate, is the Creator of the past , present and future of this time-bound Universe".

Further note the following two verses from SMBG [2]:

Maya tatamidam sarvam jagadavyakta murtinā,
Matsthāni sarva bhutani na caham tesvavasthitah. (SMBG:9.4) (4)

"All this permeated by Me in my unmanifest aspect (as the ice by water) and all Beings abide in the idea within Me. Therefore, really speaking, I am not in them".

Yathā ā ākās'asthito nityam vayuh sarvatra go mahān,
Tathā sarvāni bhutāni matsthānityupadhāraya . (SMBG:9.6) (5)

"Just as the extensive and all-pervading air (which is born of ether) always remains in ether, likewise know that all Beings (sprung as they are from my thought) abide in Me".

As a matter of fact, there are several other verses in SMBG (see, e.g., SMBG: 2.6; 9.7-9.10) which clearly support such a theory of creation. In this context, another two verses are worth quoting here, namely

Avibhaktam ca bhutesu vibhaktamiva ca sthitam,
Bhutabhartra ca tajgyeyam grasisnu prabharisnu ca. (SMBG:13.16) (6)

which means, " though indivisible (like ether), It stands as if divided among Beings. That knowable substance is sustainer of Beings (as *Visnu)*, destroyer (as *Rudra*) and creator (as *Brahmā)*". This verse directly hints to the process of 'second quantization' of modern physics of the same all-pervading field of consciousness. Another verse, viz.,

Yaccāpi sarva bhutānām bijam tadahamarjuna,
Na tadasti binā yatsyānmayā bhutam carācaram. (SMBG: 10.39) (7)

Meaning thereby, "Arjuna, I am even that which is the seed of all Beings. For there is no creature in the Universe, animate or inanimate, which exists without me", clearly emphasizes that the same element of consciousness is the seed (cause) of existence of both Beings and non-Beings in the Universe.

The Verse (1) actually defines the Supreme (the Creator of the Grand Creation, termed as '*Sristi*' – a cosmic consciousness field, henceforth denoted by Φ_{cc}) in terms of several of its characteristics and emphasizes the creation, sustaining and destruction of Universe(s) in this Grand Creation but was covered with darkness or was not noticeable in the absence of consciousness (a characteristic of Φ_{cc}). The Universe in its micro (or seed-like) form, while covered with darkness [3] was highly localized (or confined). It is only after that it was illuminated with consciousness, that is the causal form of the Universe became dynamic-manifest form as elaborated in Verse (2). According to another verse of Rigveda (Mandal 10, Sutra 121, Mantra 1), Φ_{cc} was present even prior to this manifestation of Universe. The Universe not only contained the *panca mahabhutas* in their primordial form but the later also evolved out of it as a sequential chain in the order of their fineness.

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Clearly Φ_{cc} is all in all as far as the creation and subsequent realization of the Universe(s) via both animate and inanimate substratum is concerned as per Verse (3). Other adjectives added to Φ_{cc} in Vedic literature (see, for example, SMBG: 12.3 and 12.4) are: it is unthinkable, all-pervading, imperishable, ineffable, eternal, immobile, un-manifest and immutable. We shall be guided by these adjectives in the further development of the subject.

Verses (4) - (7) of SMBG while supporting clearly such concepts of Vedas, allow us to have a picture of Grand Creation as follows: (i) The Lord is creator, sustainer and destroyer, i.e., the corresponding processes go in Φ_{cc} , out of Φ_{cc}, and by Φ_{cc} itself, (ii) His presence is a must but has no role as such in these processes; everything goes in a self-consistent manner, also (iii) the creation as such is not present in Him but works well in His presence by way of introducing a causal system, called *'Prakriti'*. The example cited to this effect is that of ice and water, which are separate but coexist as the two forms of the same entity (water). It is the Māyā (the ignorance or the limited capacity of an individual to understand the world-order or the role of '*Prakriti*' in it) that gives the feeling of ice and water as the two separate entities. Further, (iv) His role in the above mentioned processes is independent of the type of creation, i.e., Beings and/or non-Beings via *Maya*. At this point several questions arise in one's mind but the important one is that as to how such an object with these features and details (called Supreme/God/*Virāta Purusa*') can exist and side by side becomes all-pervading and permeable through all. The answer is Yes. While God and *Sristi* are inseparable, it is possible to think of such an object in accordance with Verses (1)-(3) of Vedas. It is the finest subtle possible, and fundamental cosmic consciousness field (definitely subtler than the gravitation-like physical fields) Φ_{cc} that conforms to all the adjectives listed above.

4. Cosmic Consciousness Field and Spatiotemporal World

4.1A Field Theoretic Model

In view of the above Vedic concepts and the available physical concepts of Sect.2, we make here the following plausible assumptions:

(1) There exists a finest and subtlest possible all-pervading fundamental field termed as cosmic consciousness field (Φ_{cc}) with the above properties. This field acts as a pure source of consciousness in its nascent or un-manifest form (i.e., it does not depend on anything, then what to say of space time variables; space time however enter in its manifest form).

(2) In Φ_{cc}, there exist and embedded some epi-fields (the word 'epi' means that they have their ground in Φ_{cc} itself) like field of cosmic desire Φ_{CE}, field of cosmic intelligence Φ_{CI}, field of cosmic mind Φ_{CM}, and the field of five cosmic elements , Φ_{CEL}. These fields in their partially dressed (or undressed) form in general are the functions of space (q), time (t) and the consciousness variable (μ) but their primordial versions, namely $\tilde{\Phi}^{(\infty)}_{CE}, \tilde{\Phi}^{(\infty)}_{CI}, \tilde{\Phi}^{(\infty)}_{CM}, \tilde{\Phi}^{(\infty)}_{CEL}$, which basically represent their infinitely dressed versions with consciousness are independent of these variables. Further we denote $\Phi_{CEL} = \{E_a, W, A, F, E_t\}$ for the nascent version, and $F_{CJ}(q,t,\mu)$ (for J=E, I, M, EL) for the epi-fields in general. As a matter of fact, as the order of dressing of an epi-field with consciousness tends to infinity, its dependence on space time accordingly decreases and becomes zero for the infinitely dressed versions. On the other hand, in the totally undressed case, the epi-fields attain their nascent versions but in a limited domain and attain strong space time dependence. The epi-fields become perceptible with some lowest order of dressing with consciousness.

(3) Such a field consisting of Φ_{cc} and epi-fields in their primordial versions, namely $\tilde{\Phi}^{(\infty)}_{CE}, \tilde{\Phi}^{(\infty)}_{CI}, \tilde{\Phi}^{(\infty)}_{CM}, \tilde{E}^{(\infty)}_{a}, \tilde{W}^{(\infty)}, \tilde{A}^{(\infty)}, \tilde{F}^{(\infty)}, \tilde{E}^{(\infty)}_{t}$, when quantized, the (discrete) quantized version, in the form of the Being b, in general, will carry the features of all these primordial fields including that of Φ_{cc} in the back ground.

(4) Within this frame work, several salient points regarding the origin of life at the time of conception are easily understandable. In fact the mindsets of the parents at this time will bring in the roles of q, t and μ. Depending upon the state of their mindsets, the parents will accordingly transcend these features available already in the cosmos in primordial forms by way of undressing them. The rest remains a biological evolution more or less in accordance with Darwin. We shall return to some of these details in Sect.5

(5) The same cosmic consciousness now manifests in two forms— the cosmic one with a 'hole' (Kaushal, 2015) in it [4] and the quantized (or localized) one through the Being b. Note that corresponding to this b, $\bar{b}$ is unique but only at the time of quantization or conception, otherwise both b and $\bar{b}$ keep on changing with the order of undressing of primordial versions and that of dressing of microcosm versions with consciousness, respectively. An entity is now perceived by the two— by *Virāta Purusa* of SMBG at the cosmic scale as a result of undressing of the primordial forms and by b at the microcosm level as a result of dressing of his EOLs with consciousness.

(6) While both b and $\bar{b} \equiv \Phi_{c\bar{c}}$ - b, always remain in the networking and the interplay, each of them tries to merge in Φ_{cc}.

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4.2 *Virāta Purusa* and the (microcosm) human Being b of SMBG

About the human Being b a lot has already been said in terms of its EOLs via patomic model (Kaushal, 1994; Kaushal, 2011; Kaushal,2015). In view of the above postulates it is worthwhile to note once again a correspondence between the *Virāta Purusa* and the human Being b as per SMBG (cf. Table 1).

The 'hole' (the structure created in Φ_{cc} as a result of second quantization)-particle (the Being b, that has now come in the womb of mother) dynamics continues not only for one but for several life spans. In fact, each of them gets chance to undergo changes with respect to the roles

Table 1: Some analogies between the microversion (i.e., the patomic model of b) and the cosmic version (*Virāta Purusa*) of the Grand Creation (Φ_{cc}) from the point of view of field theory of physics.

S.NO.	Human Being (b)	*Virāta Purusa* (V)
1.	Soul (SO)	Cosmic Consciousness field (Φ_{cc})
2.	Ego (E)	Cosmic Desire of the Creator (Φ_{CE})
3.	Intellect (I)	Field of Cosmic intelligence (Φ_{CI})
4.	Mind (M)	Field of Cosmic mind (Φ_{CM})
5.	Biological body B and the senses of knowledge and action (matter inside the body in the form of solid, liquid, gas, Plasmon and ether form)	Field of Cosmic elements (Φ_{CEL}) or panca mahabhutas alongwith their perception/ reception features with reference to gross and micro bodies of b
6.	The Jiva (b)	The *Virāta Purusa*
7.	Worldly objects (WO) or the stimulants	Manifest cosmic creation (*Prakriti*) and the world order.

of consciousness at the level of its both cosmic and localized versions in conjunction with appropriately undressed epi-fields or appropriately dressed EOLs. At times these cosmic and micro versions work like a teacher and disciple in consonance.

4.3 Dressing of epi-fields with consciousness

With regard to the dressings of EOLs of a human Being with consciousness it is already discussed (Chapter 8 of (Kaushal,2011)) through *'trikaran'* rule for inner EOLs M, I, E and through '*dvikaran*' rule for outer EOLs B and SE. In fact, the infinitely dressed versions of E, I, M, namely $\tilde{E}^{(\infty)}, \tilde{I}^{(\infty)}, \tilde{M}^{(\infty)}$, are basically the epi-fields $\Phi_{CE}, \Phi_{CI}, \Phi_{CM}$ present in Φ_{cc} in primordial form. With regard to the dressing of nascent cosmic elements E_a, W, A, F, E_t, the dressing rule in the form of *pañci karan* rule of Vedic science, is also discussed. According to this rule a perceived element, say the *mahabhuta* earth, for example, consists of 50% of the nascent (physical) earth E_a and 12.5% of each of the remaining four nascent PMs and the same is true with other perceived PMs. In mathematical terms, we write the first order dressing of E_a with consciousness as,

$$\tilde{E}_a^{(1)} = \frac{1}{2}E_a + \frac{1}{8}W + \frac{1}{8}A + \frac{1}{8}F + \frac{1}{8}E_t \,, \qquad (8)$$

and similar expressions for the first order dressings of W, A, F and E_t. Here, we generalize this *pañci karan* rule for the infinite order dressing, to derive the primordial version of epi-field Φ_{CEL} which basically consists of $\tilde{E}_a^{(\infty)}, \tilde{W}^{(\infty)}, \tilde{A}^{(\infty)}, \tilde{F}^{(\infty)}, \tilde{E}_t^{(\infty)}$. In case of second-order dressing, we write for $\tilde{E}_a^{(2)}$

$$\tilde{E}_a^{(2)} = \frac{1}{2}\tilde{E}_a^{(1)} + \frac{1}{8}\tilde{W}^{(1)} + \frac{1}{8}\tilde{A}^{(1)} + \frac{1}{8}\tilde{F}^{(1)} + \frac{1}{8}\tilde{E}_t^{(1)} \,. \qquad (9)$$

Or,
$$\tilde{E}_a^{(2)} = \frac{20}{64}E_a + \frac{11}{64}W + \frac{11}{64}A + \frac{11}{64}F + \frac{11}{64}E_t \,,$$

and similar expressions for $\tilde{W}^{(2)}, \tilde{A}^{(2)}, \tilde{F}^{(2)}, \tilde{E}_t^{(2)}$ (see Chapter 8 of (Kaushal,2011)). In general, the nth order dressing E_a in terms of $(n-1)^{th}$ order dressing can be expressed as

$$\tilde{E}_a^{(n)} = \frac{1}{2}\tilde{E}_a^{(n-1)} + \frac{1}{8}\tilde{W}^{(n-1)} + \frac{1}{8}\tilde{A}^{(n-1)} + \frac{1}{8}\tilde{F}^{(n-1)} + \frac{1}{8}\tilde{E}_t^{(n-1)} \,, \qquad (10)$$

and similar expressions for the n-th order dressings of W, A, F and E_t Using (10) one can express the dressed entities at any order in terms of their nascent versions. From the above generalization of the *pañci karan* rule, it is worthwhile to deduce several interesting observations:

(i) At any stage of dressing note by construction that

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$$\widetilde{E}_a^{(n)} + \widetilde{W}^{(n)} + \widetilde{A}^{(n)} + \widetilde{F}^{(n)} + \widetilde{E}_t^{(n)} = \widetilde{E}_a^{(n-1)} + \widetilde{W}^{(n-1)} + \widetilde{A}^{(n-1)} + \widetilde{F}^{(n-1)} + \widetilde{E}_t^{(n-1)}$$
$$= E_a + W + A + F + E_t \,. \qquad (11)$$

Similarly in the context of '*trikaran*' rule for inner EOLs we have noticed earlier (Kaushal,2011) that

$$\widetilde{M}^{(n)} + \widetilde{I}^{(n)} + \widetilde{E}^{(n)} = \widetilde{M}^{(n-1)} + \widetilde{I}^{(n-1)} + \widetilde{E}^{(n-1)}$$
$$= M + I + E \,. \qquad (12)$$

Results (11) and (12) imply that the consciousness while dresses the entities separately, its net effect on a particular set of entities is absent or not noticeable. In other words, this particular system works in a self-consistent manner, i.e., without involving the external agency (consciousness) directly in its working, but definitely in the presence of the external agency. This supports the spirit of "*Guṇā Guneṣu Vartantu* ...." of SMBG (Verse 3.28).

(ii) As the order of dressing tends to infinity ($n \to \infty$) or the entities become infinitely dressed with consciousness, they attain the primordial versions and become the part of cosmos (Φ_{cc}). Thus,

$$\Phi_{CE} \equiv \widetilde{E}^{(\infty)}, \Phi_{CI} \equiv \widetilde{I}^{(\infty)}, \Phi_{CM} \equiv \widetilde{M}^{(\infty)}, \Phi_{CEL} \equiv \left\{\widetilde{E}_t^{(\infty)}, \widetilde{F}^{(\infty)}, \widetilde{A}^{(\infty)}, \widetilde{W}^{(\infty)}, \widetilde{E}_a^{(\infty)}\right\}.$$

There is definitely no role of space time at this stage. However, at any arbitrary order of dressing, n, all perceived PMs are explicit functions of space (q), time (t) and the meditation variable (μ), characterizing the consciousness. Note that the epi-fields $\widetilde{M}^{(n)}, \widetilde{I}^{(n)}, \widetilde{E}^{(n)}$ are the functions of μ alone. Alternatively, one can say that it is the nth order of undressing of the primordial entity which an individual scientist/philosopher perceives.

(iii) Modern physical theories deal with the concepts of many Universes and higher dimensions. These concepts can easily be understood in the present sceme of study. For example, as n increases from 0 to ∞, there is a possibility of having infinitely many categories of Universes as a result of partitions of elements of the set $\widetilde{F}_{EL}^{(n)}(q,t,\mu) \equiv \left\{\widetilde{E}_a^{(n)}, \widetilde{W}^{(n)}, \widetilde{A}^{(n)}, \widetilde{F}^{(n)}, \widetilde{E}_t^{(n)}\right\}(q,t,\mu) \equiv \widetilde{U}^{(n)}(q,t,\mu).$, possibly with different orders of dressing for each. While they are the functions of q, t and μ, the nature of these Universes depends on the dominance of the constitutent(s) present in these partitions. In fact, the *panci karan* rule is the discrete way of evolution or de-evolution of an entity with respect to consciousness, or for converting a P-matter entity into an EP-matter entity and finally into a SEP-matter entity (Kaushal, 2011).

(iv) While the meditation variable μ is directly linked with the order of dressing n, the nascent versions (at the end-point of undressing or at the initial point of dressing) of PMs exist in four space time dimensions of Einstein; otherwise at every stage of dressing with consciousness (i.e., by using a physical instrument with an improved resolving power or by an individual with his further developed FOUs) the extra dimension of the nascent entity increases and this goes up to infinity until the entity merges with Φ_{cc}. At this stage the entity becomes infinite dimensional— a feature of a field in the physical sense.

(v) As to how the FOUs of an individual develop, it is described earlier (Kaushal,2011) by the '*trikaran*' rule for the inner EOLs, M, I and E. Note that these inner EOLs, whether in their nascent or dressed form, do not depend on space time explicitly, like that of the constituents of $\widetilde{F}_{EL}^{(n)}$, but only on μ. For a conscious person, this μ, while originating from the micro version of Φ_{CC} ,i.e., SO, nonetheless has limitation and the same, in turn, limits the development of his FOUs. According to *trikaran* rule, for any m^{th} order dressing, we have $\widetilde{F}_M^{(m)}(\mu) \equiv \left\{\widetilde{M}^{(m)}, \widetilde{I}^{(m)}, \widetilde{E}^{(m)}\right\}(\mu)$, where each constituent is a function of μ.

(vi) Although it depends on the quality of the perceiver in terms of the development of his FOUs, there is no reason as to why the order of dressing of M, in general, should be the same as that of the order of undressing of Φ_{CEL}. In order to discover the constituents of $\widetilde{U}^{(n)}(q,t,\mu)$, the order of dressing of $\widetilde{F}_M^{(m)}$ of a scientist, i.e., m should be the same as the order of undressing n of the primordial form. Only then a scientist will perceive the entity in a true sense. This is how the knowledge transcends to an individual from the cosmic agencies, like from the primordial versions of epi-fields. This perhaps was the way in which the knowledge of Vedas transcended initially to early seers.

An explanation of both evolution and dissolution of Beings in Φ_{cc} can also be analyzed in the same spirit.

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5. Other Possible Aspects of the Study

5.1 *'Prārabdha'* of a Human Being and the 'Hole-Particle' Picture of Creation

Note that epi-fields with their infinitely dressed versions are embedded in Φ_{cc}. For all other orders of dressing (or undressing) with consciousness they however float around in Φ_{cc}, including their nascent versions. On the other hand, every human Being, b, also carries at least partially dressed versions of his inner EOLs. At the time of conception, this is the matching of the three dressed versions of apparently different entities in their subtle form that affects the nature of creation of a baby in the womb, besides the physical environment given, namely the orders of dressing of mindsets of mother and father, and that of the floating epi-fields around. Of course, all this happens in the background of Φ_{cc} or of its microversion SO, of each of the parents. In fact, at the time of conception it is a kind of 'bigbang' or 'second quantization' that takes place in Φ_{cc} and the Being b (synonym of 'particle' in physical theory) is created leaving behind a unique and identical 'gap' $\bar{b}$ (synonym of 'hole' in physical theory) in the sea of Φ_{cc}, at this particular point of space time. These 'hole-particle' interactions starting now, continue till the death of the Being (i.e. when b finally merges with Φ_{cc}) and the same constitute the main cause of the so-called *'Prārabdha'* type of actions of b as described in Vedic science.

Note that both hole and particle ($\bar{b}$ and b) undergo continuous changes during the life span of b as a result of separate dynamics taking place at the cosmic level on the one hand, and at the microcosm level of inner EOLs of b, on the other. Thus, in the Karmic theory of Vedic science, the *'Sancit'* and *'Kriyamān'* types of actions of a Being are the attributes of local (microcosm level) dynamics of EOLs, whereas the *'Prarabdha'* type is the outcome of cosmic dynamics taking place between b and $\bar{b}$ or among various epi-fields. In fact, the networking of holes and particles corresponding to all Beings in Nature distinctly continues through their respective life spans. Further, this distinctness arises due to different orders of dressing (or undressing) with consciousness at different levels.

5.2Master-desciple type relationship and they are in race

Once the Being b (consisting of EOLs SO, E, I, M, B, SE in the field of WO, which consists of PMs $\equiv\{E_a, W, A, F, E_t\}$), is created out of the sea of epifields (which are embedded in Φ_{cc}), then the gap left behind, $\bar{b} = \Phi_{cc} - b$, remains in a peculiar type relationship with b. In some sense it is of disciple (b) and Master ($\Phi_{cc} - b \approx \Phi_{cc}$) type- relation. In Vedic science, these are the pictures of the human Being and the *Virāta purusa*, respectively. While the latter is the Creator of the former, He wants the former to be like Him. For this purpose, He has supplied all possible accessories, whatever He had, to the former. Somehow the disciple does not use the entire set of accessories supplied by the Master because of his limited free-will and self-sense. At times, the Master shows hard time to disciple to judge his ability of overcoming the self-sense or of using the free-will rightly. In this endeavour, the disciple often fails and does not succeed in proving his-self like his Master. This continues now and then on earthly scale under the constant watch of the Master, but there is every possibility that in the end, after prolonged efforts, perhaps in several cycles of birth and death, the disciple will become like his Master by eliminating all his negatives.

5.3 Why the antimatter of physical theories does not exist?

The hole-particle picture, proposed by P.A.M. Dirac for spin-half fields, is better applied to nuclear structure studies rather than to the problems in quantum field theory. For physicists, no doubt the fields are systems with infinite degrees of freedom but are still localized in space and time or with reference to the all-pervading property—an attribute of Φ_{cc}. While anti-particles (and hence the anti-matter) do exist in the localized region and for a limited time, their existence at the cosmic scale is not yet established. In the present context of cosmic consciousness field, it is not difficult to understand the non-existence of $\bar{b} = \Phi_{cc} - b$. Clearly, in the limit when the order of dressing tends to infinity, b≡CUMUG develops tendency to merge with Φ_{cc}, independent of the nature of $\bar{b}$. Moreover, in comparison with infinite Φ_{cc}, the microcosm $\bar{b}$ is merely a negligible entity. Further $\bar{b}$ in comparison to b, does not evolve with consciousness to the same extent. In physical theories, however, the particle and anti-particle retain their entities and their annihilation is considered only in a localized region of space time.

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6. Cosmic Consciousness Field vis-a-vis Higgs Field of Physics

An interesting feature about the Φ_{cc} and the associated epi-fields can be derived from thephenomenon of spontaneous symmetry breaking in physics. As a matter of fact, the field Φ_{cc} with two types of embedded epi-fields , namely $\widetilde{F}_{M}^{(m)}(\mu) \equiv \left\{\widetilde{M}^{(m)}, \widetilde{I}^{(m)}, \widetilde{E}^{(m)}\right\}(\mu)$ and $\widetilde{F}_{EL}^{(n)}(q,t,\mu) \equiv \left\{\widetilde{E}_{a}^{(n)}, \widetilde{W}^{(n)}, \widetilde{A}^{(n)}, \widetilde{F}^{(n)}, \widetilde{E}_{t}^{(n)}\right\}(q,t,\mu) \equiv \widetilde{U}^{(n)}(q,t,\mu).$ are symmetrically spread all over in the Universe. While the first category of epifield is the direct attribute of consciousness (as they are the functions of μ alone), the second category is linked with space time and meditation variable (material world). Naturally, the space time dependence would acquire mass and the same generates in the process of evolving, where as the first category goes without mass. Coincidently, these two situations match with two types of Bosons (field quanta) investigated in the so-called 'Higgs mechanism' in physical theories (Itzykson and Zuber, 1986; Kaku, 1993).

Now in the calmly distributed Φ_{cc}, there occurs spontaneous symmetry breaking through a Higgs like mechanism (see, e.g., (Itzykson and Zuber, 1986; Kaku, 1993) dealing with the concept of degenerate vacua. Accordingly, two types of epifields come into existence— one field quantum without mass and the other with massive field quantum. Such studies are in progress and will be incorporated later in the talk and reported elsewhere (Kaushal, 20XX).

7. Summary and Conclusions

- Keeping the knowledge of Vedic science in mind and using the tools of quantum field theory, an attempt is made here to understand the origin, sustenance and destruction of both animate and inanimate entities in the cosmos.
- Creator (God) of the Grand Creation ('*Sristi*') is identified with the cosmic consciousness field Φ_{cc} and the associated epi-fields are postulated. The second quantization of the latter forms the basis of origin of Beings in general and the human Being in particular.
- The 'explanatory aim' of these studies is very much fulfilled by generalizing the dressing rules (Kaushal,2011) for inner EOLs (*'trikaran'* rule) and for PMs (*pañci karan* rule) with consciousness.
- As a system evolves with time (by making a trajectory in space, for example), at the same time it also evolves with consciousness of the observer, thus improving the understanding of the latter about the world order.
- Present formalism can perhaps provide a basis for an improvement in the science of astrology (Kaushal, 2011a) which at present suffers from its poor predictive power.
- In some sense, GOD (an abbreviation of 'generator', 'organizer', 'destroyer'), the synonym of Φ_{cc}, is defined as the cause of dynamism in cosmos via cosmic desire, leading to actions of animate and via binding forces leading to the structure and motion of inanimate entities towards their existence, survival and sustenance.

Some conclusions can also be drawn here with reference to two striking coincidences in modern scientific observations— one pertains to the creation of animate and the other to the creation of inanimate entities in the cosmos. In the womb of the mother, the germinated seed, embryo evolves and grows in a big way for about nine months. During this period the growth and development of the fetus in terms of physical and biological features, passes through all the stages that a vertebrate species has passed through a period spanning over billions of years or so in order to attain the present shape and size of humans. In another case, when two heavy ions with relativistic (high) energies collide in the laboratory, they produce, possibly in a localized region and for a small enough duration, the same stuff (called quark-gluon plasma) as was produced during the first few fractions of a second after the Bigbang which occurred during the origin of early Universe. Both these phenomena, no doubt, occur in the present space time domain, however take the mind or the faculty of understanding of a scientist back to billion years ago. In philosophical terms, while all this is a modeling game (see, (Kaushal, 2011), Appendices B and C), a possible absolute truth hidden behind could be that they are the undressed versions of the primordial epi-fields in Φ_{cc} present earlier, now and also in future. It is a matter of realizing them now at the FOU level by an individual scientist.

Acknowledgements

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Foot Notes

[1] Here we cite only a few relevant verses which are quoted in "***Satyartha Prakash***" by Swami Dayanand Saraswati.
[2] See, any edition of Sri-mad Bhagvad-Gita, Gita Press Gorakh Pur, (Here abbreviated as SMBG).
[3] Note that the 'darkness' discussed here is with respect to the (cosmic or local) consciousness unlike the 'darkness' discussed in physics which is with respect to the light or in general with respect to the electromagnetic field.
[4] The 'hole-particle' formalism is an effective tool to study the nuclear structure properties within the frame work of the so called field-theoretic methods. See, for example, (Brown,1964).

Talk 2: (Hall 2)

Understanding the dynamics of human cognitive processing system by studying hand movement: A new possibility in kinematics

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Key words: Human cognition, mouse tracking, action, cognitive processing, trajectory

Introduction

Cognitive Science is a rapidly growing field worldwide. With the innovation and availability of tools and techniques that can record information processing during human cognition the field is witnessing an upsurge of studies conducted in different labs across the globe. Equipment like Electroencephalogram (EEG), Functional Magnetic Resonance Imaging (fMRI), Magnetoencephalography (MEG) have made it possible to record brain signals and understand the brain mechanisms. Measuring saccades, fixations and pupillary dilation as a response to stimuli using eye-tracking has enabled us to understand oculomotor mechanisms of cognitive processing. In a country like Nepal where the study of Cognitive Science or Cognitive Neuroscience itself has not started yet, when we may be able to use the above measures for understanding human cognitive processing is still uncertain. However, we can make at least a modest beginning by making use of the cost-effective mechanisms and tools available to us. And when we have developed expertise, we may go for advanced methods. In this article, I will discuss on tracking the mouse trajectories as kinesthetic measurement of hand movement to measure the cognitive processing and its possibility for the implementation in the study of human cognition as hand in motion is an index of mind in motion (Freeman, Dale & Farmer, 2011) while briefly reviewing the studies conducted using this paradigm and showing what possibilities lie ahead.

Ever since the first publication of the work on phonological processing using mouse-tracking by Spivey and colleagues in 2005, subsequent researches and publications and launching of the software MouseTracker (Freeman &Ambady, 2010), this paradigm has generated sufficient interest among scientists working in the areas of human cognition in different laboratories in many countries. It has proved to be easily accessible and powerful tool for understanding human cognitive processing.

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Language processing

Tracing the trajectories of hand movement as the participants make response using the mouse-cursor has shown it can capture the cognitive processes both in monolinguals (Spivey et al, 2005; Barca et al, 2015) and bilinguals (Bartolotti& Marian, 2012; Morett&MacWhinney,2012; Lin et al, 2015; Lin & Lin, 2016; Incera& McLennan, 2015,2016). Spivey and colleagues (2005) showed that when monolingual participants are faced with words that share phonological similarities like 'candle' and 'candy' their initial trajectories may deviate towards the phonological competitor before reaching the correct target. Likewise, Barca and colleagues showed that the pictorial stimuli that share phonological similarity with the spoken words are processed faster than the lexical stimuli. Among the bilinguals, Bartolotti and Marian showed the bilinguals are better in learning a novel language compared to monolinguals as shown by faster trajectories in bilinguals. Contributing to the bilingual advantage research literature, Incera and McLennan (2015) showed bilinguals behave like 'experts' compared to monolinguals which was shown in the way two groups initiated the mouse movement : monolinguals initiated faster but reached the target slower than bilinguals who took a little longer time in initiating the mouse movement. Pathak and Mishra (manuscript in preparation) have shown a bidirectional parallel language activation in Gurung – Nepali bilinguals by recording the continuous movement of the hand trajectories.

Social and cultural cognition

Combining fMRI and real-time hand tracking, Stolier& Freeman (2017) made participants categorize faces that varied in gender and racial typicality. Participants' hand trajectory deviated towards unselected category while categorizing atypical faces. The findings showed that the conflicting facial features were resolved with the assistance of conflict monitoring regions via competition between co-activated ventral-temporal representation. Krendl& Cassidy (2017) showed how racial prejudice affects racial and social categorization suggesting that in certain perceivers racial prototypicality may enhance category competition as reflected in slower response latencies during categorization

Crime Investigation

Analyzing the trajectories of the mouse movement as the respondents respond to the unexpected questions, mouse tracker has opened up the possibility of detecting faked identity thus making an important contribution in the area of security and crime investigation. Monaro and colleagues (2017) showed that even without the prior information on the examinee, it is possible to distinguish a liar from a truth-teller by simply making them respond to the unexpected questions and by analyzing their response patterns as revealed by the trajectories of the mouse-movement. While truth-tellers respond automatically whereas liars have to 'build up' responses that creates a difference in their response latencies and number of errors. Exploiting the kinematic analysis of mouse movement as implicit measure of deception, the authors have established that this paradigm can be a very powerful lie detection tool and contribute significantly to crime investigation research. In a social threat and motor response study, Capellini and colleagues (2016) showed participants responded faster for ingroups compared to outgroups while observing an action when threatening objects are present in a given context, thus showing interaction between membership and contextual cues.

Decision Making

The response alternatives and the certainty / uncertainty elements of the responses are dynamically traced by the mouse movement trajectories. The action dynamics as shown by current trajectories and kinematics influence the decision making process. Lepora and Pezzulo (2015) used perceptual decision making task to compare three decision making models: serial decision-then-action, parallel decision-and-action and embodied choice model in which action feeds back into decision making. Their results showed that the two key components – action preparation and commitment – of embodied choice are better suited to combine action and decision to make it more ecologically valid. In a lexical decision task experiment Barca and Pezzulo (2015) asked participants to categorize lexical and non-lexical stimuli and recorded mouse movement trajectories as they made the response. They found participants used different online processes in making the choice. They used continuous competition process for categorizing Low Frequency words and discrete revision process for Pseudowords.

Memory, attention and mindfulness studies

Abney and colleagues (2014) recorded mouse-tracking trajectories as the participants performed prospective memory (ability to remember to execute a delayed behavior) tasks to investigate the continuous nature of attentional allocation processes supporting prospective memory cue retrieval. The authors provided evidence for cue focality suggesting that spontaneous retrieval of prospective memory task may have been contributed by controlled processing of non-focal cues.Xiao and Yamauchi (2017) scrutinized to what extent does the top-down attention enhance unconscious semantic processing and found that top down attention modifies the time course of subliminal semantic processing (manipulated by SOA of 50, 200, 500 and 1000 ms) and that temporal attention window lasts more than 1000 ms.Chong et al (2015) examined the effect of a brief 6-minute mindfulness induction on the acquisition of a new behavior (moving the direction reversed computer mouse cursor) and found a significant interaction between time and condition in terms of number of errors made while initiating the mouse for the trials in normal mouse orientation (old behavior) thus showing the effect of mindfulness induction.

Data extraction and analysis

Mouse tracker generates very rich data giving 60 – 70 data points per second in a normal computer. One can do a normalized time step analysis or raw time analysis of trajectories along x and y coordinates of the computer screen. Unlike button-press reaction time experiments, it gives continuous measure of cognitive processing. Data can be analyzed in many ways (Hehman et al, 2015) including the use of R (Mirman, 2014) or Matlab (Calcagni et al, 2017).

Conclusion

In this brief review, an attempt has been made to show the possibility of conducting various kinds of studies pertaining to human cognition

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using a simple and powerful tool like mouse tracker. The fact that so many studies are emerging from the laboratories of different countries shows that now we are in a better position to understand human science and scientist.

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Talk 3: (Hall 1)

The 'Unseen' Body; Biofield Scanning for Detection and Prediction of Health Issues

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Understanding Human Body: Various views

Human body is the most complex structure in the universe. Ancient as well as Modern scholars have tried to unveil the complexity using the methods available in the respective era. Progressively, we are learning more and more about the human body with the help of developments in technology. There are various schools of thought in understanding the body. We briefly consider three in the following paragraphs; Modern medicine which is about 150 years old, the traditional medicine of Ayurveda which is 2500 years old and the one given in Vedanta, specifically, in Yoga philosophy, which is 5000 years old.

Modern medicine represented by allopathy, considers human body as a machine and attributes 11 important systems such as circulatory, respiratory, digestive, excretory, nervous and endocrine, immune, integumentary, skeletal, muscle and reproductive systems. All the systems work together in co-ordination to maintain a functioning human body [1]. Depending on the method of investigation, Human body can be 'seen' differently. E.g. X rays, sonography, MRI, CT, Pet Scan give different pictures for the body.

Ayurveda follows the principle of *"Pindi te Brahmandi"*; i.e. The contents of the universe and that of human body are the same. The contents are classified as Panchmahabhootas; i.e. five elements, specifically, Prithvi (Earth), Aap (Water), Tej (Fire), Vayu (Air) and Aakash (Space). Body also has Chaitanya or soul or Atman or consciousness.

Tridoshas- three substances- Kapha, Vat and Pitta carry out catabolism and anabolism in the body. The health or ill health of the body depends on the right proportion of these three substances. Along with three Doshas, one has to consider Dhatu and Mal while studying the body. There are 7 Dhatus (substances); Ras (fluids), Rakta (blood), Mans (flesh), Med (Adipose tissu), Asthi (bones), Majja (Bone marrow) and Shukra (generative tissue). Also, There is Upadhatu (sub-categoty) to each of the Dhatus. Mal refers to Urine, stool and sweat. Dhatu and Mal are also substances and get affected by Tridoshas.

Vedik science proposes that the physical human body that we see, is the Annamay Kosh (body) and there is a subtle body comprising of 4 more Koshas with each individual, which are essential for life. They are: Pranamay Kosh (Etheric or Astral Body), Manomay Kosh (Mental Body), Vidnyanmay Kosh (Causal Body) and Anandamay Kosh (Supracausal/Bliss body)[2]. Chakra, Nadi (meridians or energy flowing network) and surrounding Aura or Corona operating in energy domain is the characteristic of invisible subtle body. Subtle body is also termed invisible body or energy body.

As Ayurveda is 'Upaveda' of Rigveda, the Chakra, Nadi (meridians or energy flowing network) and Aura or Corona are part of Ayurveda under the term 'Chaya-Prabha'.

Human Energy Field - Biofield Scan

The 'unseen' body, i.e. 'energy body' as mentioned above, can be visible with the advancement in technology. 'Energy body' reflects the electro-magnetic field around each one of us. The electro-magnetic field around the body is also called The Human Energy Field (HEF) or Aura or Biofield. Using 'Biofield Scan', the 'unseen' energy body can be visualized. Biofield scan is mapping energy emission from living and nonliving objects.

According to Quantum Physics, every material, living or non-living has dual existence, in the form of particles and waves. The human body emits, communicates with, and is made from Light. Prof. Alexander Gurvich, discovered the existence of 'bio-photon' in 1941 during his mitogenic radiation work. Technically, bio-photon is an elementary particle of non-thermal origin in the visible and ultraviolet spectrum emitted from a biological system. Bio-photon emission is the spontaneous emission of ultra-weak light emanating from all living systems, including human beings [3].

Bio-photons are always emitted *before* every bio-chemical reaction. Without the bio-photon signal, there can be no chemical reaction; they are like a steering system for all the bio-chemistry that takes place in the body. The emission of bio-photons is an expression of the functional state of the living organism and its measurement therefore can be used to assess this state. Cancer cells and healthy cells of the same type, can be discriminated by typical differences in bio-photon emissions [4]. During any physical, emotional or mental issue, a causative disturbance is always found in the quality of bio-photon emission.

Biofield scan not only describes the present pathology but also past events and can predict future health issues in physical, psychological, emotional and spiritual dimensions. Prediction of future health issues is possible because biofield scan picks up the energy disturbances before they have become full blown physical problems. Thus a biofield scan provides a visual proof for blockages/disturbances in

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energy flow in the meridians before they appear in the Physical body in the form of diseases.

The Scanning Procedure

The room is illumined by a full-spectrum fluorescent tube light which simulates daylight. The camera captures stills of a person in various positions and feeds them to the computer. The software captures the interference pattern between tube light and the person's energy field, giving the live images. Following points are observed.

- 2-3 hours of fasting
- No cloths except inner garments
- Male patient scanned by Male technician only
- Female patient scanned by Female technician only
- 14 to 16 still images recorded for 360^0 energy assessment
- Diagnostic Report available immediately along with detailed debrief
- The whole process is completed in 45 minutes
- Treatment options suggested based on patient`s willingness

Biofield Scan Analysis

During biofield scan, all the chakras are scanned and are visualized. The seven parts scanned- the crown, brow, throat, chest, abdomen, back and solar plexus- correspond to the seven chakras mentioned in Ayurveda. The chakras correspond to the endocrine glands as well as they have correspondence with Panch-Koshas mentioned earlier. Therefore it is easy to interpret the visualized energy patterns.

From Root Chakra corresponding to Annamay kosha, we can predict Issues like hernia, Piles, Prostrate , Immunity, Hormonal Imbalance, Varicose Veins, financial and emotional instability, etc.

The Pranmay Kosha contains 7 major chakras, 350 minor chakras (energy zones) and 72000 energy flowing rivers called Meridians or Nadis. We can predict issues like Liver, Kidney, Diabetes, Psychic Attacks etc. Pranmay Kosha corresponds to sacral and solar chakra.

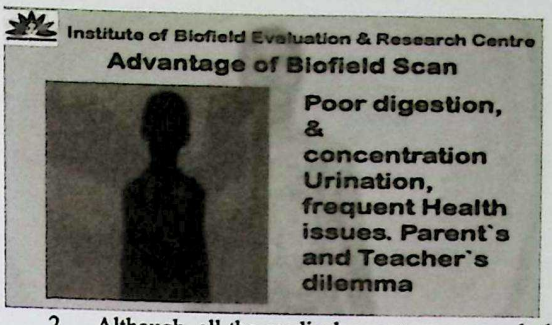
From Heart chakra corresponding to Manomay Kosh, we can predict issues like B.P., Cholesterol, Mental depression, Childhood Trauma or sufferings, etc

From Throat and Ajna/Brow Chakra, which corresponds to Vidnyanmany Kosh, we can predict on the issues like Struggling Phase in Career, success or failure, dissatisfaction from present employment, unsteady progress in many activities, intuition power, etc.

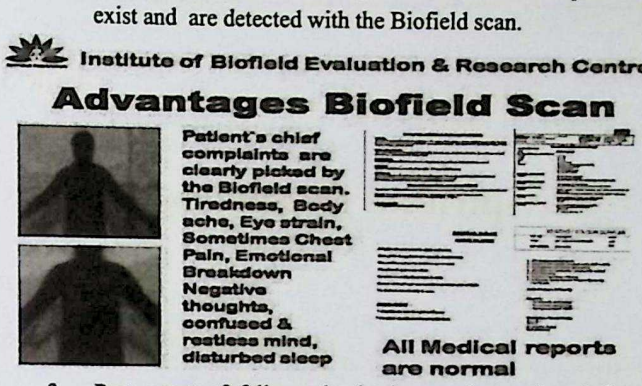
Crown Chakra corresponding to Anandmay Kosh can predict issues like head injury, Depression and Psychic imbalance [5]

Sample Biofield Scans

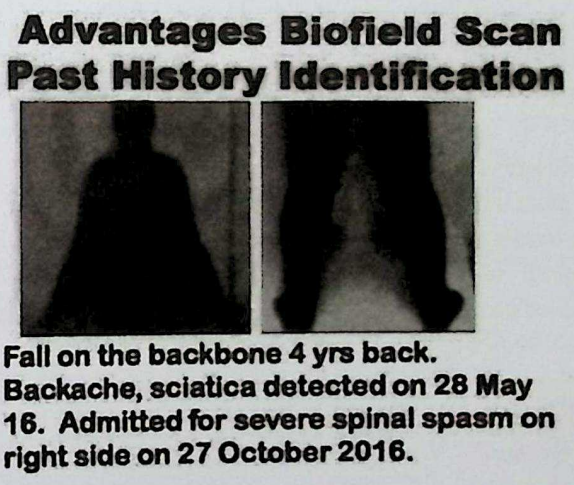
1. Physical and mental issues mentioned with the scan are detected.



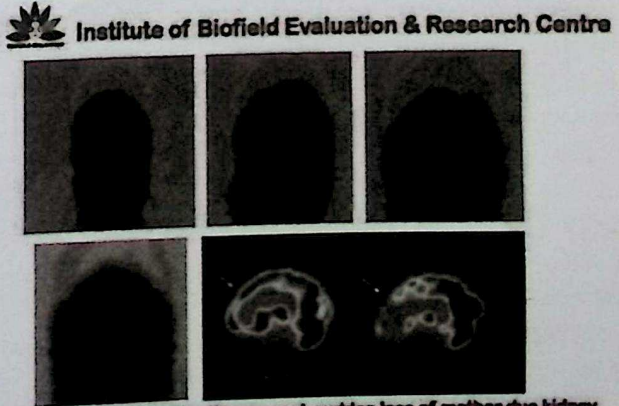
2. Although, all the medical reports are normal, the problems exist and are detected with the Biofield scan.



3. Past event of fall on the back was detected and future issues related to backache and sciatica were predicted from the scan.



4. Biofield scan and MRI of the brain, both showing mental and emotional trauma.



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Conclusion

We have shown that the Biofield scan unleashes the information stored in the 'unseen' body. It detects the health issues much before they manifest in the physical body. It is reliable health prediction system based on Vedik knowledge of human body. Biofield Scan is non-invasive, radiation free, painless and cost effective health scanning system. Biofield scan can detect mental, emotional issues and spiritual progress where modern medical science fails to do so.

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Talk 3: (Hall 2)

The spiritual properties of plants for activating higher consciousness

Dr. Khaga Raj Sharma

Research Scholar, Central Department of Chemistry, TU, Nepal

The use of natural products with therapeutic properties is as ancient as human civilization and these natural products are the foundation of preventing and curing different diseases. Natural products include a large and diverse group of substances from a variety of sources. They are produced by marine organisms, bacteria, fungi, and plants.

From ethanobotanical survey, it is clear that indigenous peoples use a wide range of medicinal plants therapeutically to maintain their health. Traditional cultures have long understood that both nature and humankind are endowed with intelligence and spirit. They understood that plants have a spirit. These traditional healers believe that the beginnings of disease originate from an imbalance or disharmony in our emotional and spiritual bodes and that plants are effective in healing these diseases. Plant spirit medicine is a powerful, gentle, subtle healing modality. Plant spirit medicine healers call upon the spirits of the plants to bring balance and harmony to their patients, removing whatever may be standing in their way as they endeavor to live joyful balanced lives. Plants have a direct line to source energy, and it is this energy that causes healing to take place. This source energy is powerful. The container of our bodies needs to be free of clutter and to have the capacity to hold the enormous spiritual energy that moves through us as we work with plant spirits.

Healing is a journey that engages our whole being of heart, soul and spirit and is not a linear process but instead follows a spiral pattern. As we spiral through life we periodically reach new understandings allowing healing to reach deeper levels each time filling ourselves more fully with our true essential nature. Ancient systems of natural healing such as botanical, Ayurvedic and Chinese medicine tell us that plants have properties that can help transform us in remarkable ways. This goes beyond the biological functions we know in the west to include energetic and even spiritual dimensions. Plants not only convert the raw energy of the sun into the nutrients needed for human life, they can repair and restore our body, slow the effects of aging, and even expand our awareness. Understanding the medical and spiritual therapeutic powers of plants give us practical wisdom to improve our daily life and advance our intimate knowledge of the nature of the universe. Proper use of medicinal plants can lower stress, as well as make us more healthy and vibrant by boosting our immune system, detoxifying organs and tissues, and rejuvenating our cells. The methods of preparation fall into many categories like, plant parts applied as a paste, juice extracted from the fresh plant parts, and powder made from fresh or dried plant parts, some fresh plant parts, and decoction. External applications (mostly for skin diseases, snakebites, and wounds) and internal consumption of the preparations were involved in the treatment of diseases. Many scientific studies of traditional medicines have lead many ways of screening for novel bioactive compounds and to design and chemically synthesizing similar structures.

The ancient Ayurvedic scholars analyzed all known physical and mental diseases one by one. The links between medicinal plants and our spiritual evolution has been deeply studied in ancient systems of natural healing such as botanical medicine, Ayurveda and Chinese medicine. Plant spirit healing consists of developing a relationship with a variety of plants to see which type of medicine they have to share. Developing skill and depth of perception to look into the person's spirit to see what it needs. One or more plants are selected which can offer exactly what the person needs. The plants are called upon as spiritual presences to help supply what the person needs. The way that looks is unseen. There is a distinct and viable possibility that we can indeed rebuild the spiritual bridge that connects humanity to the living matrix of the planet, the plants as well as the bountiful

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natural elements that surround us. Some medicinal plants showed the strong spiritual properties. Calendula is a powerful spiritual herb that will bring healing as well as activate our innate healing abilities. This tea repairs our aura and brings energetic protection. Ginger tea releases anger and frustration. Hibiscus tea makes a wonderful ruby colored infusion. It allows us to accept our sensitive side. The spiritual plant hibiscus brings our loved ones together. It heals past wounds and promotes forgiveness. The peace lily is believed to provide a means of prospering spiritually, mentally and physically. It improves the flow of energy in the home by purifying the air and neutralizing harmful indoor gases. The smell of rosemary can instantly lift our mood, reduce fatigue, fight anxiety and improve memory. When money plant is placed in front of a sharp corner or angle it helps to reduce anxiety, stress and negative thoughts. The Aloe Vera plant bears good luck and positive energy. The energy that the Aloe Vera plant releases can fight off bad luck and negative vibes. Peppermint is a common yet still powerful spiritual plant that helps motivate and inspire us, bringing new creative ideas on how to achieve our dreams. Rose tea is an ancient, sacred spiritual herb that opens our heart. Citrus lemon provides a strong impact on the mental body, thus making it easier to make decisions. The left brain is stimulated so that mathematical, computer, and language skills are activated.

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Parallel Session: Views of Vedānta and Science on Consciousness

Chairpersons (Hall 1): Sisir Kumar Roy, Ph.D., *Visiting Chair Professor, National Institute of Advanced Studies, IISc Campus, Bengaluru, India*

&

Garga Chatterjee, Ph.D., *Assistant Professor, Indian Statistical Institute, Kolkata, India*

Chairpersons (Hall 2): Krishna Das Manandhar, Ph.D., Head, *Central Dept. of Biotechnology, Tribhuvan University, Nepal*

&

Deba Prasad Dash, M.D.(Ay.), *Head, Dept. Panchakarma, Gopabandhu, Ayurveda Mahavidyalaya, Puri, India*

Talk 1: (Hall 1)

अद्वैत वेदान्तको दृष्टिमा जीवन र जगत्

डा. गुरुप्रसाद सुवेदी
सहप्राध्यापक-नेपाल संस्कृत विश्वविद्यालय
प्राचार्य- महेश संस्कृत गुरुकुल विद्यापीठ

१.विषयप्रवेशः-

वेदान्तदर्शन आध्यात्मिक चिन्तनसँग सम्बद्ध दर्शन हो । वेदान्तदर्शनलाई निवृत्तिमार्गमा लाग्नेहरूको दर्शन पनि मानिन्छ । सामान्य धारणा यस्तो छ - "आध्यात्मिक चिन्तन र भौतिक चिन्तन अलग अलग विषय हुन् । जिन्दगी चलाउन भौतिक सुख-सुविधाका साधन चाहिन्छन् । विषयमा वैराग्यको अपेक्षा राख्ने हुनाले वेदान्त-दर्शनले भौतिक अभ्युन्नतिलाई चाहँदैन । त्यसैले यो दर्शन व्यहारानुकूल छैन" आदि । यो चिन्तनलाई हेर्दा जिज्ञासा पैदा हुन्छ - के साँच्चै वेदान्तदर्शनले जीवन र जगत्को उपेक्षा गरेको छ ? अथवा यसले निःश्रेयस् सँगै अभ्युदय अर्थात् भौतिक उन्नतिका लागि पनि सकारात्मक प्रभाव पार्छ ? वेदान्तचिन्तन र व्यावहारिक जीवनमा तालमेल छ अथवा छैन ? भन्ने जिज्ञासालाई केन्द्रमा राखेर वेदान्तचिन्तनले जीवन अझ सफल र सार्थक बनाउँछ भन्ने विचारमा आधारित भई यो विचारपत्र तयार गरिएको छ । यहाँ वेदान्तको परिचय दिँदै यस चिन्तनले जीवनलाई उच्चतम महत्त्व दिएको र यसले सांसारिक व्यवहारलाई पनि सफल र सार्थक बनाउन सहयोग पुऱ्याउने निष्कर्ष निकालिएको छ ।

२.के हो दर्शन ?

संस्कृत भाषाको प्रेक्षण (हेर्नु) अर्थ दिने दृश्-धातुबाट करण अर्थमा ल्युट्-प्रत्यय गरेर तयार हुने दर्शन शब्दको अर्थ हो - यथार्थ ज्ञानको साधन । जसद्वारा तत्त्वको यथार्थ ज्ञान हुन्छ, त्यो दर्शन हो । भावमा ल्युट् गर्ने हो भने ज्ञानको साधनलाई होइन, ज्ञानलाई नै दर्शन भन्न मिल्छ । दर्शन भनेको दृष्टिकोण हो, विचार हो र वास्तवमा यथार्थ ज्ञान हो । यी दुवै अर्थ समेटेर दर्शनको परिभाषा यसरी गरिएको छ -

सम्पूर्णाया दृश्यसृष्टेर्यद्भवेन्मूलकारणम् ।
तज्जिज्ञासा तदर्थञ्च प्रयत्नो दर्शनं स्मृतम् ॥

सम्पूर्ण दृश्य प्रपञ्चको मूल कारणका सम्बन्धमा जिज्ञासा राख्नु र तत्सम्बन्धी प्रयत्न गर्नुलाई दर्शन भनिन्छ । वास्तवमा 'दर्शन' शब्दले अन्तर्दृष्टिले हेर्नु वा चिन्तन गर्नु भन्ने अर्थ दिन्छ । यो बाह्य इन्द्रियसँग होइन, आत्मासँग सम्बन्धित विषय हो । तर जीवन–जगत्, सृष्टि–स्थिति, जन्म–मृत्युजस्ता विविध विषय र तिनका कर्ता तथा नियन्ताका सम्बन्धमा गरिने चिन्तन पनि दर्शनसँग सम्बन्धित हुन्छ । त्यसैले विद्वान्हरू भन्छन् - सुनिपुण न्यायसङ्गत विचारद्वारा समग्र विश्वको मूलतत्त्वको अन्वेषण एवम् आविष्कार गर्नुको नाम नै दर्शनशास्त्र हो (खप्तड स्वामी, २०५८ : ५५)

यहाँ यो कुरा स्मरणीय छ कि पूर्वमा प्रचलित दर्शन शब्दले दिने अर्थ पश्चिममा प्रसिद्ध फिलोसोफी (Philosophy) शब्दले दिँदैन । फिलोस् र सोफिया दुई शब्दको योगले बनेको यस शब्दको अर्थ विद्या वा ज्ञानप्रतिको अनुराग भन्ने हुन्छ तर पूर्वमा प्रचलित दर्शन शब्दको अर्थ त्यहाँभन्दा धेरै व्यापक देखिन्छ ।

३.दर्शनको भेद

प्राचीनतम ग्रन्थ वेदको नासदीय सूक्तमा देखिएको दर्शनको बीज कालान्तरमा आस्तिक र नास्तिक दर्शनको रूपमा विकसित हुँदै गएको पाइन्छ । यसै कममा वेदप्रामाण्यवादी आस्तिक बने र वेदको प्रामाण्य नमान्ने नास्तिक बने । नास्तिकअन्तर्गत चार्वाक, बौद्ध र जैन मानिए भने आस्तिक दर्शनअन्तर्गत मूलतः ६ दर्शन प्रसिद्ध भए - न्याय, वैशेषिक, सांख्य, योग, वेदान्त र मीमांसा । भनिएको पनि छ-

गौतमस्य कणादस्य कपिलस्य पतञ्जलेः ।
व्यासस्य जैमिनेश्चापि दर्शनानि षडेव हि ॥

पूर्वका हरेक दर्शनहरूले आ-आफ्नो विषय प्रतिपादनको क्षेत्र र सीमा छुट्याउन प्रमाण र प्रमेयको निधो गर्दछन् । प्रमाण नभई प्रमेय सिद्ध हुँदैन । न्यायदर्शनमा प्रत्यक्ष, अनुमान, उपमान र शब्द ४ प्रमाण मानिएकोमा वेदान्तमा अर्थापत्ति र अनुपलब्धि थपेर ६ प्रमाण मानिएको छ, । तर व्यावहारिक अस्तिकलाई स्वीकारेर प्रमाणको चर्चा गरेपनि वेदान्तमा चाँहि वास्तवमा परमतत्त्वको प्रतिपादन गर्ने मूल प्रमाण भनेको श्रुतिप्रमाण मात्र हो । श्रुति भनेको उपनिषद् हो । भनिएको पनि छ- **तं त्वौपनिषदं पुरुषं पृच्छामि ।**

प्रमेय तत्त्व भनेर अरु दर्शनमा छुट्टाछुट्टै संख्या तोकिएको छ । न्यायदर्शनमा १६ पदार्थ, वैशेषिकले ७ पदार्थ, साङ्ख्यमा २५ तत्त्व, योगमा २६ तत्त्व बताइयो । मीमांसामा यजमान, अपूर्व, स्वर्ग, तदर्थक याग, देवता आदिको प्रतिपादन गरिएको छ, तर वेदान्तमा मूलतः श्रुतिप्रमाणको आधारमा अरु पदार्थको चर्चा नगरी दृक् र दृश्य दुई पदार्थको विवेचना गर्दै दृश्यको पनि अधिष्ठानको रुपमा दृक् अर्थात् ब्रह्मतत्वको प्रतिपादन गरिएको छ ।

पूर्वमा प्रचलित ती दर्शनहरूमा सबैभन्दा बढी विकसित दर्शन वेदान्तदर्शन हो । यससँग सम्बन्ध राख्ने शैव, शाक्त र वैष्णव आदि अन्य दर्शनहरू पनि छन्, वेदान्तअन्तर्गत पनि विशिष्टाद्वैत, द्वैताद्वैत, द्वैत, अद्वैत, अनिर्वचनीय भेदाभेद आदि

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विभिन्न मतान्तर छन् तर सबैको मूल आधार प्रस्थानत्रयी नै हो । त्यसैले तत्त्वको प्रतिपादन गर्ने शैलीमा मतभिन्नता भए पनि अन्तिम मिलनबिन्दु पहिल्याउँदा सबैमा समन्वय हुन सक्छ । यहाँ अद्वैत वेदान्त दर्शनको संक्षिप्त परिचय दिँदै त्यसको आधारमा जीवन र जगत् प्रतिको वेदान्तको दृष्टिकोण पहिल्याउने प्रयत्न गरिएको छ ।

४.अद्वैत वेदान्त दर्शन

ब्रह्म वा आत्मालाई एक मात्र सत्य ठान्ने, ब्रह्मका अतिरिक्त कुनै वस्तुको पारमार्थिक सत्ता स्वीकार नगर्ने दर्शन अद्वैत वेदान्त दर्शन हो । प्रस्थानत्रयी यसको मूल आधार हो । श्रुति, स्मृति र न्याय तीन प्रस्थान हुन् । श्रुति प्रस्थान भन्नाले उपनिषद्, स्मृतिप्रस्थान भन्नाले गीता र न्यायप्रस्थान भन्नाले व्यासप्रणीत ब्रह्मसूत्र हुन् । यिनै तीन प्रस्थानको व्याख्याको रूपमा आचार्यहरूले भाष्यको रचना गरेका छन् । आद्य जगद्गुरु शङ्कराचार्य (७८८-८२०) को शांकरभाष्यले अद्वैत वेदान्त दर्शनलाई परिपुष्ट गरेको छ । उनका शिष्य र उत्तरवर्ती आचार्यहरूले पनि यसै सिद्धान्तको व्याख्या र परिष्कार गरेका छन्, जसबाट वेदान्तको अद्वैतधारा समृद्ध भएको छ ।

उपनिषद् भन्छ - **सदेव सौम्य इदमग्र आसीत्, (छा.उ. ६)** हे बाबु ! सृष्टि हुनुभन्दा पहिले यो सम्पूर्ण जगत् सत् मात्र थियो । **एकमेवाद्वितीयम्,** (छा.उ ६) स्वगत, सजातीय र विजातीय भेदरहित अद्वितीय एक सत् मात्र छ अरु केही होइन । **सर्वं खल्विदं ब्रह्म, (छा.उ.)** यो सम्पूर्ण जगत् ब्रह्म नै हो । **नेह नानास्ति किञ्चन,** (वृ.उ.) यहाँ कुनै अनेकता छँदै छैन । **मृत्योः स मृत्युमाप्नोति, य इह नानेव पश्यति** (वृ.उ.) जसले एक ब्रह्ममा अनेकता देख्छ त्यसले भेददृष्टिका कारण जन्ममृत्युको चक्रमा भौतारिनु पर्छ । **द्वितीयाद्वै भयं भवति** (वृ.उ.) दुई देख्नु नै भयको कारण हो इत्यादि । ब्रह्मसूत्रमा पनि **तदनन्यत्वमारम्भणशब्दादिभ्यः** भनेर कारणदेखि कार्य भिन्न हुदैन भन्ने कुरा सिद्ध गरिएको छ । माटो एउटै हुँदाहुँदै पनि अनेक नाम र रूपहरूको परिकल्पना गरिन्छ तर वस्तुतः माटोबाट बनेका सबै चीजहरू माटोभन्दा भिन्न होइनन् । यस्तै जगत्को कारण ब्रह्ममा परिकल्पित प्रपञ्च ब्रह्मभन्दा भिन्न होइन भनिएको छ । भगवद्गीतामा पनि **क्षेत्रज्ञं चापि मां विद्धि, वासुदेवः सर्वमिति,** इत्यादि वचनले अद्वैतसिद्धान्तलाई स्थापित गरिएको छ ।

ज्ञान प्राप्त नहुँदासम्म सत्य लाग्ने जीव र जगत् आदिको भेद ज्ञान प्राप्त भएपछि समाप्त हुन्छ, किनभने ब्रह्मबाहेक अरु कुनै वस्तु छँदैछैन । जीवको जन्म–मरण एवम् उत्पत्ति र विनाश पनि अविद्याजनित हो । जीव र ब्रह्म एउटै भए पनि अविद्या या अज्ञानका कारण अनेक जस्तो आभास हुन्छ । अविद्या वा अज्ञानले ब्रह्ममा जीवभाव खडा हुन्छ भने ज्ञानले अविद्याको अन्त्य भएपछि जीवभाव पनि नष्ट भएर ऊ ब्रह्म नै हुन्छ । यही अविद्यारूपी अज्ञानलाई हटाउन तत्व ज्ञानको आवश्यकता पर्छ । **ज्ञाते द्वैतं नविद्यते** (मा उ १।१८) । परमार्थ तत्व जानेपछि द्वैतको अस्तित्व रहँदैन ।

यहाँ जिज्ञासा हुन्छ, यो अद्वैतसिद्धान्त व्यवहारानुकूल भएन कि ? व्यवहारमा तिमी म भनेर जीवन जगत्लाई छुट्याएर हेरिएको हुन्छ । तमः प्रकाशवत् विरुद्धस्वभावयोः अर्थात् आत्मा र अनात्म पदार्थ अन्धकार र उज्यालो जस्तै परस्परविरुद्ध भिन्नाभिन्नै कुरा हुन् । यिनीहरूमा द्वैत प्रत्यक्षसिद्ध छ । प्रत्यक्षविरुद्ध भएकोले अद्वैत सिद्ध हुन सक्दैन ।

यसको समाधान गर्दै भनिएको छ - कारणवश एक पनि अनेक देखिन्छ, नेत्रदोषले एउटा चन्द्रमा पनि अनेक झैं देखिन्छ । डोरी पनि सर्पझैं देखिन्छ, सिपी पनि चाँदीझैं देखिन्छ । जसरी भ्रान्तिस्थलमा अज्ञान कारण हुन्छ, त्यसरी नै यहाँ एक ब्रह्म अनेक देखिनुमा अविद्या वा माया कारण हुन्छ । **इन्द्रो मायाभिः पुरुरूप ईयते ।(वृ.उ.)** त्यही मायाका कारण जीव, जगत्, आत्मा, परमात्मा र अन्य सम्पूर्ण सांसारिक प्रपञ्च खडा भएको हो, सृष्टि र प्रलय पनि त्यही माया वा अविद्याको विलास हो । अब प्रश्न उठ्छ, के हो अविद्या ? जसले ब्रह्मलाई ढाकिदिन्छ । अनि ब्रह्म के हो ? जीव र जगत् के हो ? यी कुरा बुझ्न वेदान्त दर्शनका आधारभूत निम्न मान्यतामाथि दृष्टि दिनु जरुरी छ ।

५.वेदान्तका मूलभूत सिद्धान्तहरू:-

क) ब्रह्म

वेदान्तदर्शनमा ब्रह्मलाई नित्य, शुद्ध, बुद्ध, मुक्त स्वभाववाला, सर्वज्ञ, सर्वशक्तिसम्पन्न, निर्विकार, निराकार, तत्त्व मानिएको छ । सत्, चित् र आनन्द यसको स्वरूप लक्षण हो । जगत्को उत्पत्ति, स्थिति र लयको कारण हुनु यसको तटस्थ लक्षण हो । जगत्को अभिन्न निमित्तोपादान कारण पनि ब्रह्म हो र जीवभाव पनि ब्रह्ममा नै खडा हुन्छ भन्ने वेदान्तसिद्धान्त हो ।

ख) जगत्

बाहिर देखिने पञ्चमहाभूत र तत्सम्बन्धी सृष्टि ब्रह्ममा मायाद्वारा खडा हुन्छ । अन्यत्र कहीं नसुनिएको अभिनव चिन्तन वेदान्तदर्शनले दिएको छ - जगत्को सृष्टि ईश्वरले गर्छ भन्ने मात्र नभएर ईश्वर नै जगत्को रूपमा खडा हुन्छ भन्ने वेदान्तचिन्तन देखिन्छ । ऊ आफैं निमित्तकारण बन्छ र जगत्को सृष्टि गर्छ । **स ईक्षाञ्चक्रे** (प्रश्नोपनिषद् ६/३) । **स प्राणमसृजत** (प्रश्नोपनिषद् ६/४) । **तत्सृष्ट्वा तदेवानुप्राविशत्** । यस्तै ब्रह्मले आफैं जगत् बनूँ, एक छु अनेक बनूँ भनेर परिकल्पना गर्छ र ऊ स्वयं जगत् बन्छ भन्ने कुरा **बहु स्याम् प्रजायेय** (.....) **तदात्मानं स्वयमकुरुत** (तैतिरीयोपनिषद् २/७) । आदि श्रुतिमन्त्रहरूले बताएका छन् । यसको आधारमा ब्रह्म नै जगत् हो । मायाद्वारा केवल कीडार्थ जगत् बन्छ । संसार अविद्या या मायाको उपज हो । अतः ब्रह्मसत्तादेखि भिन्न सत्ता जगत्को छैन भन्ने सिद्ध हुन्छ । ऐनामा प्रतिविम्व देखिएझैं यो समस्त विश्व अद्वितीय ब्रह्ममा प्रतिविम्बित भएर देखा परेको छ । **विश्वं दर्पणदृश्यमाननगरीतुल्यं निजान्तर्गतम् ।**

ग) जीव

असङ्ग ब्रह्म नै मायाद्वारा सृष्टि प्रपञ्चमा लाग्छ र ऊ स्वयं मोहित भए झैं गर्छ । हुँदाहुँदै अविद्यासँग मुछिँदा काल्पनिक जीवभाव खडा हुन्छ । शरीर, इन्द्रिय र अन्तःकरणसँग मिलेको चैतन्यलाई जीव भन्ने संज्ञा दिइन्छ । ती अनात्म पदार्थहरूसँग लसपस हुँदा स्वयं अजन्मा चैतन्यलाई म जन्मिने मर्ने हुँ भन्ने भान हुन्छ । यही काल्पनिक जीवभाव हो । ज्ञानद्वारा म शुद्ध चैतन्य हुँ, शरीर र इन्द्रियसँगको मेरो सम्बन्ध अवास्तविक हो भन्ने जानेर आफ्नो वास्तविक स्वरूपमा अवस्थित रहदा जीवको जीवत्व समाप्त हुन्छ र ऊ शुद्धचैतन्य बन्छ । जसरी दुधमा नौनी र काठमा आगो रहन्छ त्यसरी नै संसाररमा ब्रह्म व्याप्त भएर रहन्छ र त्यही अक्षर ब्रह्मबाट प्रज्वलित आगोवाट फिलिङ्गा उत्पन्न भए जस्तै जीवहरू उत्पन्न हुन्छन् भन्ने कुरा औपनिषद् अद्वैतदर्शनको निष्कर्ष हो ।

६. ज्ञानको महत्व

उक्त वेदान्तसिद्धान्तको आधारमा जीवन र जगत्लाई हेर्दा हाम्रा सामु देखिएको सुख, दुःखको परिकल्पना अवास्तविक हो र क्षणिक हो भन्ने सिद्ध हुन्छ । यही क्षणिक तुच्छ जीवनलाई साँचो ठानेर व्यवहार गर्दा त्यसमा आसक्ति हुन्छ, आसक्तिले अझ बढी मानसिक सम्बन्धको तानावाना बुन्ने गर्छ र त्यसपछि चाहेको वस्तु प्राप्त हुँदा त्यसमा राग बढ्छ र प्राप्त नभए द्वेष बढ्छ । यसप्रकार विषयासक्तिको कारणले नै दुःख हुन्छ । त्यसको निवृत्तिका लागि विषयमा आसक्ति हुनुहुदैन र सम्पूर्ण जगत् प्रपञ्चको मूल अधिष्ठान पूर्ण परमात्म तत्त्वको बोध हुनुपर्दछ ।

वेदान्त दर्शनले जीव र ब्रह्म अभिन्न भएको र यो सम्पूर्ण जगत् प्रपञ्च ब्रह्ममा नै खडा भएको कुरा बताउँछ । अविद्याद्वारा एकमा अनेक, निर्गुणमा सगुण, निराकारमा साकार र अरूपमा नाना रूपको परिकल्पना हुन्छ । ज्ञानद्वारा अविद्याको निवृत्ति भएपछि भेदभ्रम निवृत्त हुन्छ । त्यसपछि भेदको प्रतीतिद्वारा हुने भय र शोकको पनि समाप्ति हुन्छ । वेदमा भनिएको छ - **तत्र को मोहः कः शोकः एकत्वमनुपश्यतः** । गीतामा भनिएको छ - **ज्ञानाग्निः सर्वकर्माणि भस्मसात्कुरुतेऽर्जुन ।** गौडपाद भन्नुहुन्छ - **ज्ञाते द्वैतं न विद्यते ।**

तर यो ज्ञान कर्मद्वारा साक्षात् हुँदैन किनभने ज्ञान नित्य छ, ब्रह्मरूप छ, ब्रह्मभन्दा भिन्न होइन । त्यसैले ब्रह्मको ज्ञान अथवा ब्रह्ममा ज्ञान दुवै भन्न मिल्दैन । वास्तवमा ब्रह्म नै ज्ञान हो र ज्ञान नै ब्रह्म हो । त्यसैलाई सत्, चित् र आनन्द पनि भनिन्छ । यो चिद्रूप शाश्वत ज्ञान कुनै उपायद्वारा पैदा हुने होइन । मात्र अविद्यानिवृत्ति भएपछि भइरहेको वस्तुको पुनः बोध हुनु हो । गलामा रहेको माला बिर्सिएर अन्यत्र खोजे पनि थाहा पाएपछि भएकै वस्तुको पुनः प्राप्ति भए झैं ब्रह्मज्ञानद्वारा भएकै स्वस्वरूपको पुनः अनुसन्धान हुने हो । यसलाई **प्राप्तस्य प्राप्तिः** र **परिहृतस्य परिहारः** पनि भनिन्छ ।

यसप्रकार ज्ञानलाई नित्य सिद्ध गर्न कर्मजन्य होइन भन्ने सिद्धान्त मानिएको छ । त्यस्तै मोक्ष पनि कर्मजन्य होइन र ब्रह्मभन्दा भिन्न पनि होइन । कर्मजन्य माने अनित्यतापत्ति आउँछ । अतः कर्मलाई मुक्तिको साधन मानिँदैन । सुरेश्वराचार्य भन्नुहुन्छ -

उत्पाद्यमाप्यं संस्कार्यं विकार्यं कर्मणः फलम् । नैव मुक्तौ यतस्तस्मात् कर्म तस्या न साधनम् ॥ (नैष्कर्म्यसिद्धिः)

यो कुरा बताउँदा ज्ञानका लागि कर्म साधन होइन भनियो । यसै प्रसंगमा सर्वकर्म संन्यासको चर्चा पनि गरिएको छ । वाहिरी समाजमा त्यसको प्रभाव फैलिँदै जाँदा कर्म उपेक्षित बन्यो अनि वेदान्तले कर्म र व्यावहारिक जीवनको उपेक्षा गर्छ भन्ने प्रभाव पर्न थाल्यो, तर वास्तवमा वेदान्तले अकर्मण्यभाव सिद्ध गर्न खोजेको होइन । त्यहाँ सर्वकर्मसंन्यास भनेको अकर्मण्यभाव होइन । शरीरादि अनात्माको कर्मलाई आत्मामा आरोपित हुन नदिनु र कर्म परित्याग गर्छु भन्ने आग्रहलाई कर्म ठान्नु नै सर्वकर्मसन्यास हो । **कर्मण्यकर्म यः पश्येदकर्मणि च कर्म यः** (गीता ४।१८) .....

वेदान्तसिद्धान्तमा पनि तीन किसिमका सत्तालाई स्वीकार गरिएको छ । प्रातिभासिक, व्यावहारिक र पारमार्थिक । डोरीमा सर्प देखिनु अनि सिपिमा चाँदी देखिनु र निदाएको वेला स्वाप्निक पदार्थहरू देखिनु प्रातिभासिक सत्ता हो । हाम्रो दैनिक जीवनमा गरिने क्रियाकलापहरू व्यावहारिक सत्ताभित्र पर्दछन् । ब्रह्मसत्ता पारमार्थिक सत्ता हो । व्यावहारिक जीवनका हरेक पदार्थहरू व्यावहारिक सत्ताभित्र पर्छन् । व्यावहारिक कालमा सम्पूर्ण शास्त्रको विधानलाई वेदान्तले नकार्दैन । बरु वेदान्तले बताएअनुसारको ब्रह्मनिष्ठामा पुग्न शास्त्रोक्त कर्म गर्नैपर्ने सर्त राख्छ । कर्मद्वारा चित्तलाई शुद्ध नबनाई, उपासनाद्वारा चित्तलाई एकाग्र नबनाई ब्रह्मजिज्ञासाको अधिकार नै प्राप्त हुँदैन । ज्ञानप्राप्त भएको व्यक्तिलाई मात्र कर्मको आवश्यकता छैन भनिएको हो । यसप्रकार ज्ञानीलाई कर्मको आवश्यकता नभएपनि लोकसंग्रहका लागि भने ज्ञानीले पनि कर्म गर्नुपर्दछ । त्यसैले वेदान्तमा कर्मको ठूलो महत्त्व छ । यसलाई स्पष्ट्याउन निम्न सन्दर्भहरू मननीय छन् -

क) वेदमा **कुर्वन्नेवेह कर्माणि जिजीविषेत् शतं समाः** भनेर कर्मको ठूलो महत्त्व देखाइएको छ । अज्ञान अवस्थामा कर्म चित्तशुद्धिका लागि सहायक हुन्छ । ज्ञान

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भैसकेपछि कर्म लोकोपकारका लागि उपयोगी हुन्छ । व्यापक ब्रह्मसत्ताको बोध भएपछि कर्म गर्दा स्वार्थ र संकीर्णताले नअल्मल्याउने भएकोले अझ सफलतापूर्वक कर्मसम्पन्न हुन्छ भन्ने वैदिक मान्यता छ ।

ख) गीतामा युद्धभूमिको बीच मोहवश युद्ध गर्न नचाहने अर्जुनलाई भगवान् कृष्णले गीताको ज्ञान दिनुभयो । त्यसपछि अर्जुनले कुशलतापूर्वक युद्ध गरे । अचम्मको कुरा के भने, ज्ञान नहुँदा कर्मबाट निवृत्त हुन चाहने अर्जुन ज्ञान भइसकेपछि युद्धरुप घोर कर्ममा किन प्रवृत्त भए त ? गीताका पंक्तिहरूमा कहीँ ज्ञानको र कहीँ कर्मको ठूलो महत्त्व बताइएको छ । ज्ञान र कर्म दुवै सँगै हुन नसक्ने कुरा पनि दर्साइएको छ, तर अर्जुनले ज्ञानोत्तर कर्म कसरी गरे ? यसको उत्तर शंकराचार्यले यसरी दिनुभएको छ - मानिसहरू दुई किसिमका हुन्छन् । कोही पहिल्यै चित्तशुद्ध भएका र कोही चित्तशुद्ध हुन बाँकी रहेका । चित्तशुद्ध हुन बाँकी व्यक्तिहरू कर्मका अधिकारी हुन्छन् । चित्तशुद्ध भइसकेका व्यक्तिहरू ज्ञानका अधिकारी हुन्, तर जसको चित्तशुद्ध भएको छैन तिनीहरूले कर्मद्वारा चित्तशुद्ध गर्नुपर्छ र त्यसपछि ज्ञानमा लाग्नुपर्छ । यस प्रसंगमा यो गीताको श्लोक मननीय छ -

कर्मणैव हि संसिद्धिमास्थिता जनकादयः । लोकसंग्रहमेवापि संपश्यन् कर्तुमर्हसि ॥

जनक आदि राजाहरूले कर्मद्वारा नै सिद्धि प्राप्त गरे । वास्तवमा कर्मद्वारा मात्र सिद्धि प्राप्त नगरेर कर्मद्वारा चित्तशुद्धि त्यसपछि ज्ञान र त्यसपछि सिद्धि प्राप्त हुने हो । यदि राजा जनक पहिले ज्ञानी थिए भन्ने हो भने पनि उनका लागि कर्म लोकसंग्रहार्थ आवश्यक भएको देखिन्छ । त्यसैले शास्त्रानुकूल लौकिक व्यवहार वेदान्तका लागि उपयुक्त र आवश्यक ठहर्छ । फरक यति मात्र छ कि ज्ञान नहुँदा गरिएको कर्म बन्धनको कारण हुन्छ किनभने कर्म गर्दा त्यसको कर्तृत्वभावले कर्तालाई बाँध्दछ । ज्ञान भइसकेपछि गरेको कर्म बन्धनको कारण हुँदैन किनभने त्यतिखेर कर्तामा कर्तृत्वभाव रहँदैन । पहिले अर्जुनलाई युद्ध गर्दा हुने हत्याको दोषको सम्भावना थियो किनभने उनमा कर्तृत्वभाव थियो । ज्ञानपछि उनमा कर्तृत्वभाव समाप्त भयो र फलसँग सम्बन्ध पनि रहेन । यही कुरा भगवान्ले भन्नुभएको छ -

कर्मण्येवाधिकारस्ते मा फलेषु कदाचन । मा कर्मफलहेतुर्भूर्मा ते सङ्गस्त्वकर्मणि ॥

ग) योगवासिष्ठमहारामायणमा रामले वैराग्य लिएर सबै कर्मलाई छोड्न थाल्दा वसिष्ठले ज्ञान सिकाएको र ज्ञानपछि रामले सफलतापूर्वक कर्म गरेको देखाइएको छ । भनिन्छ,

उभाभ्यामेव पक्षाभ्यां यथा खे पक्षिणां गतिः । तथैव ज्ञानकर्मभ्यां जायते परमं पदम् ॥ (योगवासिष्ठ १/७)

जसरी चरा उड्न दुई पखेटा चाहिन्छन्, गाडी गुड्न दुई चक्का चाहिन्छन् त्यसैगरी जीवन सफल बनाउन ज्ञान र कर्म दुवै आवश्यक छन् । यो योगवासिष्ठको सिद्धान्त हो ।

घ) शंकराचार्यले आफू निवृत्ति मार्गमा लागेको भए पनि चित्तशुद्धिका लागि कर्म आवश्यक हुने बताउनुभएको छ । तत्त्वसाक्षात्कारका लागि ज्ञान आवश्यक भएझैं चित्तशुद्धिका लागि कर्म नै चाहिन्छ भन्ने उहाँको भनाइ हो ।

चित्तस्य शुद्धये कर्म न तु वस्तूपलब्धये । वस्तुसिद्धिर्विचारेण न किञ्चित्कर्मकोटिभिः ॥

शंकराचार्यको मतमा जगत पारमार्थिक नभए पनि व्यावहारिक मानिएको छ र यसलाई प्रारब्धसँग जोडिएको छ । शरीर र शरीरसँग सम्बद्ध विषयहरू प्रारब्धसँग जोडिने र प्रारब्ध नभोगी नहुने भएकोले त्यसमा चिन्ता गर्न नहुने उहाँको सल्लाह छ । **प्रारब्धं त्विह भुज्यतामथ परं ब्रह्मात्मना स्थीयताम् ।** (उपदेशपञ्चक) जुन कुरा नभई छोड्दैन त्यसका सम्बन्धमा चिन्ता गर्नु हुँदैन, तर ज्ञान भइसकेपछि सञ्चित कर्म बाँकी रहँदैन । आगामी कर्म फलदायी हुँदैन । त्यसैले कर्मको सिद्धान्तमा अल्मलिएर आफ्नो लक्ष्यबाट विचलित हुनुहुँदैन । जागिसकेपछि स्वप्नमा देखिएका वस्तुका सम्बन्धमा आसक्ति र मोह हुँदैन । त्यसैगरी चेतनाको नजरले हेर्दा संसारका सुख, दुःखहरूमा आसक्त भईदैन भन्ने उहाँको भनाइ हो ।

ङ) पुराण, इतिहासमा आएका मन्त्रद्रष्टा ज्ञानी मुनि, महर्षिहरू र अर्वाचीन समयका महापुरुषहरू सबैले वेदान्तको चिन्तनको आधारमा आफ्नो जीवनलाई सफल बनाएको देखिन्छ । उनीहरूको लोकोत्तर चिन्तनबाट समाजमा ठूला ठूला परिवर्तनहरू भए । धार्मिक, आध्यात्मिक सुधारहरू भए । त्यसको मूल वेदान्तचिन्तन हो । अद्वैत वेदान्तसँग नजिक जस्तो बुद्धको चिन्तनले जुन समाजमा जुन पञ्चशीलको सिद्धान्त दियो त्यो आज विश्वसमुदायमा मानवतावादको मूल आधार बनेको देखिन्छ । त्यस्तै पूर्वका ठूलाठूला दार्शनिकहरू शंकराचार्य, रामानुजाचार्य, माध्वाचार्य, जे. कृष्णमूर्ति, रमण महर्षि, आनन्दमयी माँ, स्वामी विवेकानन्द, महात्मा गान्धी, बालगंगाधर तिलक, योगी मत्स्येन्द्रनाथ, योगी गोरखनाथ, योगी नरहरिनाथ जस्ता सन्त महात्माहरूले वेदान्त दर्शनको चिन्तनबाट प्रभावित भएर नै समाजसुधारको काम गरे ।

७. निष्कर्ष

वास्तवमा हरेक समाजसुधारक व्यक्ति निजी स्वार्थबाट माथि उठ्नु जरुरी छ । त्यसका लागि वेदान्तचिन्तनले सकारात्मक प्रभाव पारेको हुन्छ । त्यसैले वेदान्तचिन्तन जीवन र जगत्को उन्नतिको आधार हो । वेदान्तले एउटै ब्रह्मतत्त्वबाट जीवन र जगत् खडा भएको कुरा बताउँछ । **वसुधैव कुटुम्बकम्** भन्ने चिन्तन वेदान्तको उपज हो र आजको आवश्यकता पनि हो । वर्तमान विश्वपरिवेशमा समय-समयमा देखिने विद्वेष र वैमनस्य कोरा भौतिकवादको उपज हो । भौतिकवादले मात्र वर्तमानलाई हेर्छ । वेदान्तचिन्तनको आधारमा खडा भएको अध्यात्मवादले समग्रलाई हेर्छ । समग्रमा दृष्टि पुऱ्याएर हेर्दा संकीर्णताबाट माथि उठ्न सकिन्छ । व्यापक र विशाल दृष्टि बन्न सक्छ । त्यसले नै मानवताको रक्षा पनि गर्छ । अतः वेदान्तदर्शन पलायनवादी चिन्तन नभएर क्रियाशील बनाउने चिन्तन हो । जीवन र जगत्को मूल पत्ता लगाउने र महान् विचारका साथ आफुलाई चेतनाको उचाइमा पुऱ्याउने चिन्तन हो भन्ने सिद्ध हुन्छ । त्यसैले त राजा अश्वपति, राजा जनक जस्ता ज्ञानीहरूले ज्ञाननिष्ठा भएर नै निष्पृह बनेर विधिपूर्वक राज्य गरे । व्यवहारमा रहेर पनि असङ्ग बन्नु र अझ सफल बन्नु ज्ञानको विशेषता हो । असत्यबाट सत्यमा पुऱ्याउने, अँध्यारोबाट उज्यालोमा पुऱ्याउने र मृत्युबाट अमरत्वमा पुऱ्याउने यही चिन्तन हो । त्यसैले बृहदारण्यक उपनिषद् भन्छ-

असतो मा सद्गमय । तमसो मा ज्योतिर्गमय । मृत्योर्मा अमृतङ्गमय । अस्तु ॥

Talk 1: (Hall 2)

Conscious as the Centre of Well Being!

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Introduction

According to the Indian philosophy, Psychology the "soul" is defined as a non-material, eternal spiritual entity present within any living being. The symptom of the presence of the soul within a body is consciousness. The soul continues to exist after the destruction of the body and it existed prior to the creation of the body. The material body develops changes and produces offspring because of the presence of the soul within. The material body deteriorates in due cause of time and when it is no longer a suitable residence for the soul it is forced to leave the body. This we call death.

Prof. Madhav Prasad Lamichhane Collection, Kathmandu, Nepal

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Concept of soul is the native of Vedic philosophy. Nearly all of non-Vedic philosophies they do not accept the concept of soul. Soul in fact is the centre of Vedic philosophies. The word *consciousness* is derived from the Latin *con-scire* - "with-knowing". A relational, or systems, view is implicit in this etymology: pointing to the relation between subject and object, between the knower and the known. Conscious knowing (*con-scire*) is knowing-with-knowing-that-you-know.

Life or consciousness is the symptom of the soul. Conscious is the state of being aware of and responsive to one's surroundings. There is no other explanation of consciousness available. No one has been able to show life, consciousness can be generated from matter. And there are many inconsistencies which cannot be explained within the present framework, without considering the existence of the soul. Although there are very clear indications that valid scientific data could be collected on areas such as out-of-body experiences and past-life-recall because the current scientific theories don't accommodate the possibility these things could exist there has been very little real scientific study in these areas.

Some 2500 years ago, Siddhartha Gautama 'Buddha' said that life is suffering; still we need to live healthy to attain nirvana through present life and re-birthing lives yet to come. Every moment an individual is trying to balance body, mind and environment to make it secure and adapted. This seeking of security and adaptation is sought of well being. Living healthy is to keep body and mind (senses) in harmony of soul. Going beyond body is possible through mind and being beyond mind is possible through mind and body in combined! There of being beyond mind is being with soul. In Srimad Bhagvadgita it is said:

indriyani parany ahur
indriyebhyah param manah
manasas tu para buddhir
yo buddheh paratas tu sah(3.42)

The working senses are superior to dull matter; mind is higher than the senses; intelligence is still higher than the mind; and the soul is even higher than the intelligence. The soul is the master of intelligence and mind, and the senses also.

Wellness is much more than merely physical health, exercise or nutrition. It is the full integration of states of physical, mental, and spiritual well-being. Each of these dimensions act and interact in a way that contributes to our own quality of life. Healing is the process of making or becoming sound or healthy again.

The modern science has done mapping of the physical body, unlikely the ancient wisdom had equally mapped the subtle body. Today, the effect of thought and belief on the physical body is realized by medical professionals and the whole medicine field is recognizing the mind body connection. The disclosure of quantum physics show that matter and energy behave differently at the quantum level than our everyday perceptions that we are with.

Perhaps no aspect of mind is more familiar or more puzzling than consciousness and our conscious experience of self and world. It is important to note that Indian philosophy and psychology distinguishes between mind (material and non-conscious) and self. Human personality constituted of two parts: the body and the Self. The body represents the material component of personality which includes three bodies namely the physical, subtle and casual body. The self refers to the transcendental principle of consciousness which is ever existing (*Sat*), self revealing and Conscious (*Chitta*) and blissful (*Ananda*) in nature. Self is responsible for one's identity and continuity as an individual. When self is identified with non-self it is called '*Empirical self*'.

In the nescience and socialization process self is mistakenly identified with the gross body (gross), mind (subtle) or with the world of objects and experiences and pains.

Mana eva manushyanam
karanam bandha-mokshayoh.
Bandhaya visayasango
muktyai nirvisayam manah.

As quoted in Upanishads, mind is the cause of bondage and the same mind is the cause of liberation for man. Mind absorbed in sense objects is the cause of bondage, and mind detached from those all sense objects is the cause of liberation.

Consciousness is the "x-factor" in achieving radiant health and deep healing. **This new paradigm of health originates in consciousness and finds expression in your body, mind, heart, and soul as well as your relationships and community.**

Alternative healing perspectives with consciousness integrate mainstream medical knowledge with recent developments in the emerging areas of frontier sciences and insights approaches and concerns are put. It promotes a model of healing in which personal relationships, emotions,

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meaning, and belief systems are viewed as fundamental points of connection between body, mind, spirit, society, and nature. Integral medicine embraces the recognition that human beings possess emotional, spiritual, and relational dimensions that are essential in the diagnosis and treatment of disease and the cultivation of wellness.

Health (Wellness) can be influenced by far more factors than Western society and modern science once thought. Love, for example can be powerful medicine, prayers can affect real changes in our bodies, and social support can mean the difference between life anddeath.

For example, research is showing that we naturally start to resonate with each other in relationship, and become **'neuro-biologically entrained'**. In our most intimate relationships, our own and our partners' thoughts and emotions can influence the ways we navigate stress, and in turn our health and happiness. Consciousness effects happen even at a distance! i.e. distant healing (Reiki)

In many traditional cultures, **healing has been seen to flow from collective harmony** i.e. something akin to harnessing the "the field effect" of consciousness.

Self-awareness, pure presence, stillness, and silence bring us into harmony and homeostasis. We access a deeper inner knowing, make more conscious decisions, and live in greater wellness on all levels when we make time to be present with ourselves in silence.
Following this line of thought, we can distinguish unconscious psychic functioning, from the same function exercised consciously, with added awareness and perception of context ("with-knowing").

Ordinary habitual function	Conscious function, with context
Perception	Apperception
Sympathy	Empathy
knowledge or information	Wisdom or understanding
Reaction	Response
Orientation	Attention
expectation (impulse, desire)	Intention or interest
Sensing	Clairsentience
Judgement	Discernment, discrimination
habitual thinking	Mindful thinking

Conclusion

Compared to such traditional and esoteric teachings of many worlds, the modern scientific worldview, which recognizes only one level, namely the physical-material, as real, must be considered seriously incomplete. It should be believed however, along with scientists such as Fritjof Capra, Ervin Laszlo and others, that a living systems worldview should be considered the foundational science of the present age. In such a worldview, reality, both microcosmic and macrosmic, is recognized to be organized in many levels or dimensions, and the various sciences study the patterned relationships between and within levels. Such a multi-dimensional perspective is most amenable to the inclusion of the observations and mappings of the many realms of consciousness into a truly integrative and holistic worldview.

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Srimadbhagavatamahapurana as a source of research questions and model building

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ABSTRACT

Srimadbhagavatmahapurana is very popular among the puranas in the Hindu Philosophy. It teaches us the path of Bhakti, Jnana and Vairagya. However, Bhakti path has been explained as the most important to get rid of this material world of illusion. Present paper is an attempt to explain the process of developing research questions and application of theories and models in developing theoretical and conceptual framework. For this purpose, the knowledge of the Bhagavatamahapurana has been utilized. The concept of Tapatraya mentioned in the Bhagavat has been made major focus in order to claim that the knowledge of the Eastern Philosophy based on Vedas, Srimadbhagavat and Srimadbhagavad Gita is very rich and can be utilized in developing theoretical framework for a research. Further examples are presented from youth's problems. Some papers were reviewed and references were searched through internet. It is concluded that a number of research issues are based on our Vedic knowledge. We have to identify such issues and utilize them for the welfare of human society.

Context

Research is an academic activity carried out in order to find out facts. It should be systematic, logical, empirical and replicable. Most of the new researchers at the universities and institutions identify research topics without reviewing research papers, theses and reports. As a result, they face many problems. But the process of research begins with the theoretical background. In this context, the researcher has to make a review of previous studies and find out the gap in that area. Since all the topics are not suitable for research, this process will be beneficial in identifying appropriate topics.

As stated by Knight (1996) a research problem can be developed through:

- a debate between scholars about a particular issue,
- a gap in the empirical work pursued by the discourse, and
- a need for further elaboration of the theoretical dimensions of the discourse

The objectives of social research are to solve problems of society, develop or extend the theory and test the existing theory. The theme of present paper is to explain the need of theoretical issues in a research with examples of research questions and model building based on the Srimadbhagavatamahapurana, a great resource of Hindu religion and philosophy.

MATERIALS AND METHODS

Present paper is prepared by reviewing previous research works and materials. Some references were also searched through internet. Three figures have been included to illustrate the theoretical and conceptual framework for research. The first and second figures deal with population research whereas the third figure is related to youth's education. This framework is based on the Vedic knowledge with specific reference to Srimadbhagavatmahapurana.

DISCUSSION

The first part of the paper deals with the need of theoretical issues in a research. It focuses on the need of theoretical and conceptual framework. The second part is associated with the review of selected theses produced by the students under the Faculties of Education and Humanities and Social Sciences of the Tribhuvan University. The author has presented an example of sociological framework for fertility analysis which is population in population research. Based on it, a conceptual framework has also been presented. It is associated with the Tharu fertility of Bardiya District carried out by the author himself.

Theoretical Issues in a Research

Research begins with the theory. Theories and models play an important role in research work. Without the knowledge of theory, a researcher would not know what to observe and how to observe. Developing idea about theoretical background, the researcher has to review literature. If the researcher is not familiar with theoretical knowledge, the review of literature becomes a complicated task. After exploration of theoretical

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background, the area of literature review becomes quite easier. The theoretical knowledge helps a researcher to organize literature into logical order. If a researcher has to carry out a study on human fertility, the sociological framework of Davis and Blake can be adopted for analyzing fertility differentials. In migration studies, a researcher has to develop clear concepts about the models developed by Ravenstein, Lee, Todaro and others.

In conducting research, theories are essential to explain, predict and master phenomena. These phenomena could be relationships, events, or the behaviour. A theory helps to make generalizations about observations. It helps to summarize the existing knowledge in a particular area.

The theoretical framework is based on the theory and it can support a research work. It explains why the problem under study is identified. In this way, the theoretical framework serves as a basis for conducting research. It helps the researcher clearly identify the variables of the study. It can provide him with a general framework for data analysis.

Conceptual framework in a research

The theoretical framework is a tool for the research as a map works in geographical studies. After formulating the theoretical framework, the researcher has to develop conceptual framework. If a research is quantitative in nature, the investigator needs to identify variables and formulate hypotheses. A hypothesis is a statement that establishes a relationship between dependent and independent variables.

It would be better to introduce an example from population research. The study is related with the Tharu fertility. Some hypotheses have been formulated for this purpose. They are as follows:

H1: Age at marriage (female) and fertility are inversely related.
H2: Education and fertility are inversely related.
H3: Higher the occupational status of parents, lower will be the fertility.
H4: The women in joint families have high fertility compared to their counterparts.
H5: Husband-wife communication and fertility are inversely related.

The hypotheses are associated with age at marriage, education, occupation, family type and husband-wife communication. In research, they are identified as variables. Now the researcher has to develop conceptual framework in order to establish relationship between dependent and independent variables. He or she can use the sociological framework of fertility as theoretical framework here. Based on this, the researcher can develop his/her own framework by including the variables identified. One such example may be the framework used in the Tharu fertility (Cited by Jnawali, 1999). The framework is presented in figure 1.

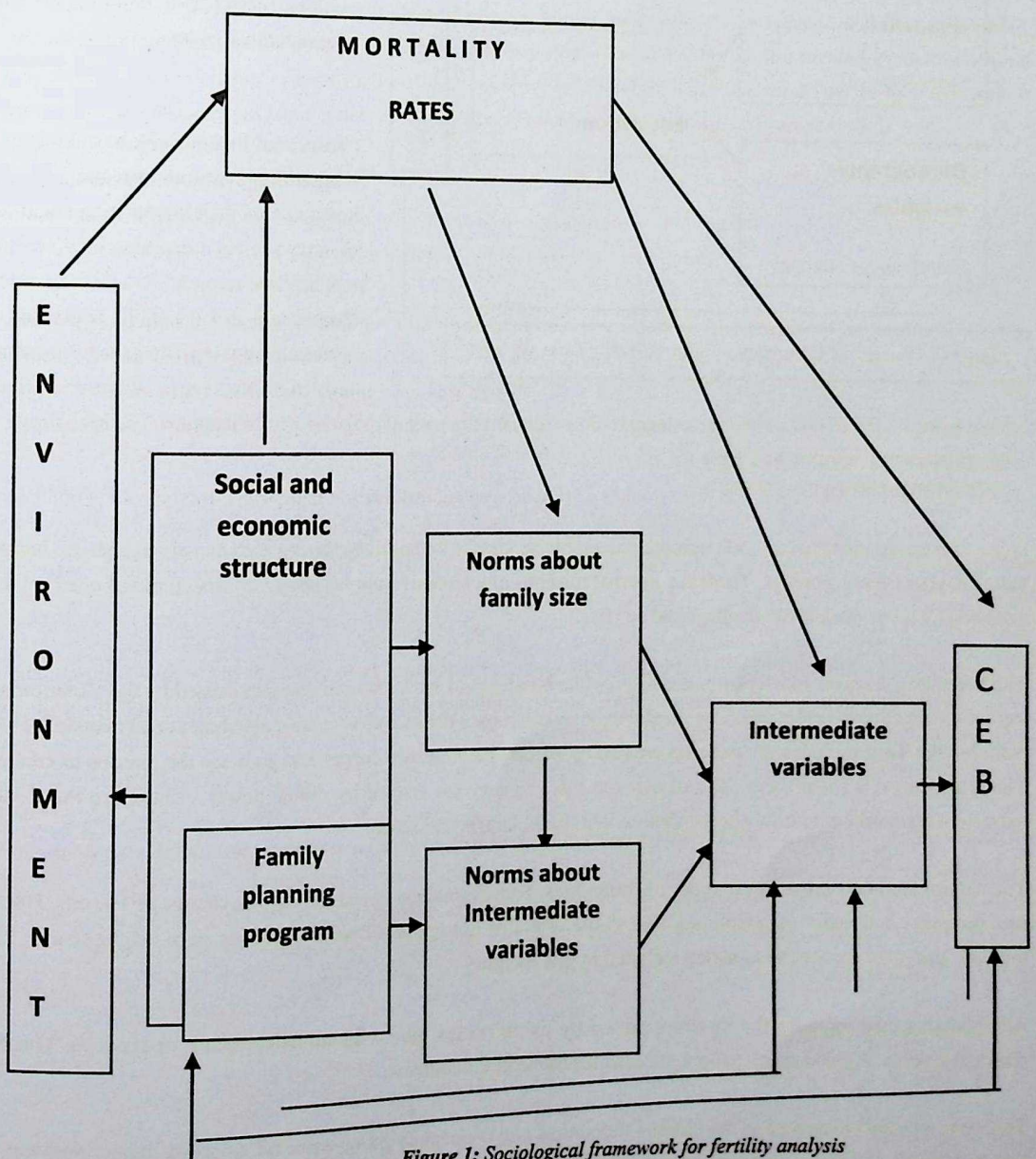

Figure 1: Sociological framework for fertility analysis

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This framework was developed on the basis of intermediate variables of fertility proposed by the American sociologists Davis and Blake. The model was synthesized and a sociological framework was proposed as mentioned in figure 1. In this figure, CEB is the indicator of fertility. It works as a dependent variable. It is affected by various factors. The factors affecting it are identified as independent variables.

Some are identified as the intermediate variables. Education can work as an intermediate variable having an indirect effect on fertility. Educated women will have knowledge about family planning devices and they will be conscious about limiting their family size.

Thus, the knowledge of the theories and models helps develop theoretical framework. The conceptual framework states where the researcher stands. A model used in the previous research can be adapted with slight modification. A simple conceptual framework used in the analysis of human fertility is presented in figure 2.

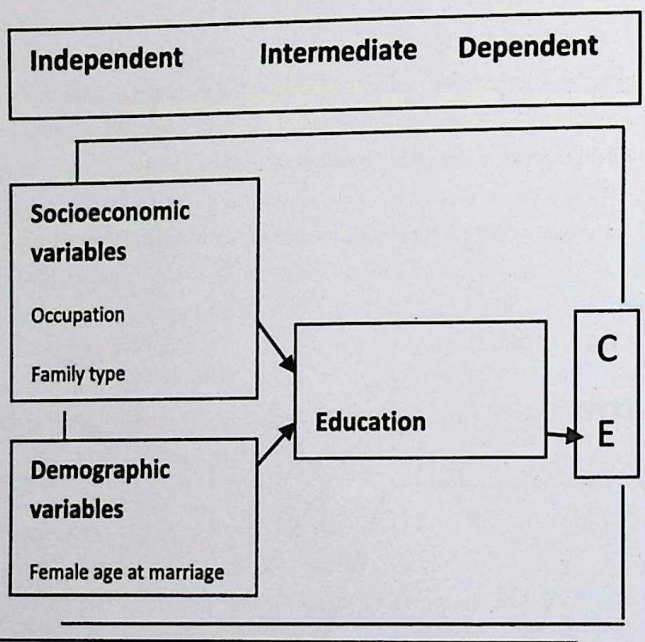

Figure 2: Conceptual framework for Tharu fertility (Jnawali, 1999

Figure 2 is related to the conceptual framework for the study of Tharu fertility. Here the CEB has been identified as the indicator of fertility. Since it depends on various socioeconomic and demographic factors, it works as a dependent variable. Occupation, family type, family status, HW communication and modern means are identified as socioeconomic variables. Female age at marriage and number of living sons are considered as demographic variables. Education and family planning are explained as intermediate variables. These two work as a bridge between dependent and independent variables.

Theoretical Framework based on the Srimadbhagavatmahapurana

A process of developing theoretical and conceptual framework for research has been explained above. The examples were given from population research. In this section, the model based on the Bhagavatam and questions addressed there are explained. The first sloka/sanhita of the Bhagavata Mahatmya from the Padmapurana has stated the three types of miseries that the living beings especially human beings have to face. They are categorized as Adhyatmika, Adhidaivika and Adhibhautika. The Mahatmya states:

सच्चिदानन्दरूपाय विश्वोत्पत्यादि हेतवे ।
तापत्रयविनाशाय श्रीकृष्णाय वयं नुमः ॥

- श्रीमद्भागवतमहापुराण।

In the first group identified as Adhyatmika, the problems caused by bodily suffering and mental anguish are included. Body and mind are the main causes of these troubles. These are internal miseries or source of troubles/obstacles arising out of ones' own body and mind, such as pain, diseases, laziness, absent-mindedness and so on.

The hereditary diseases like leprosy, disabilities like blindness or lameness and diseases caused by the violation of the rules of health and sanitation are classed under this. The mental agony caused by worries and anxieties, attachment and aversion, also comes under this group. Adhidaivika Tapa includes the miseries created by nature. Fate, unseen forces and gods are the reasons to create such problems or difficulties. The term 'daiva' is main focus. The troubles in this category are caused by divine power. These are the troubles or obstacles coming from extra-sensory world of spirits, ghosts, deities, demigods, angels and so on.

The natural elements create these types of difficulties. Some problems appear due to the change of seasons. Hot waves and cold waves are also its examples. A number of people die due to the effect of hot and cold waves in many parts of the world. Floods, earthquakes, landslides, famines, droughts etc are the miseries included in this category.

Adhibhautika tapa includes the miseries caused by living beings, like wild animals, snakes, or enemies. These are the difficulties created by physical objects. A good many people are affected by vehicle accidents.

This concept may be utilized in developing theoretical and conceptual frame work for anaysing human problems in our society. On the basis of this framework, we can anayse and interpret data associated with the problems of senior citizens and youth. Senior citizens are today neglected. They are not cared well. They contribute a lot to their family in the past but at present they are hated and sent to the Briddhashram. It is observed that they are in critical stage. Their interaction with researchers and journalists is its evidence.

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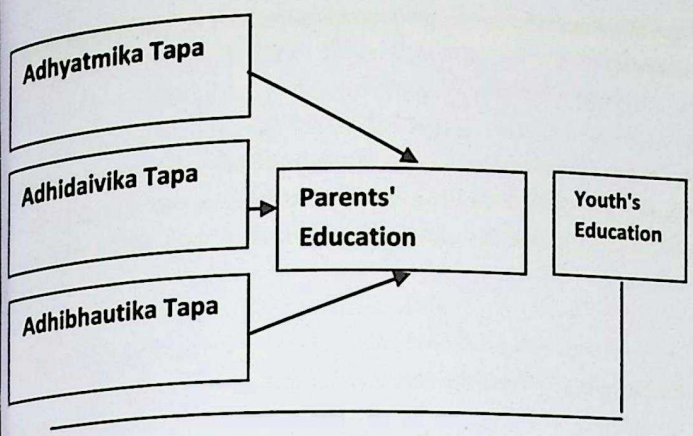

Figure 3: Conceptual framework for youth's education.

Another mass population is represented by youth. Many young people are migrating to foreign countries in search of employment. Many developing countries like Nepal are facing a serious problem of brain drain. They move to developed countries in acquiring with an aim to get quality education and employment. Gradually, they attempt to stay permanently over there. In this context, the social scientists have to carry out research on youth's problems. The Vedic knowledge of tapatraya based on the Srimadbhagavatmahapurana can be utilized in their research activities. A framework is proposed as in figure 3.

The social scientists like geographers, demographers, sociologists may conduct research work by applying this tapatraya model to the population of youth and elderly population. The figure 3 is associated with Tapatraya based on the Bhagavat. In this case, youth's education is supposed to be affected by tapatraya. These three types of obstacles can be pacified by the initiation of parents. If parents are educated, they will try to find out solution to this problem. In the same way, family status also plays a role in educating youth. These two variables can play a role of intermediate variables directing youth's education. This is a general idea that can be developed from Vedic knowledge. The researchers can develop model according to the nature of their problem.

The university students are in need of carrying out research at the end of Master and MPhil studies. They have to prepare thesis based on data from field survey. Similarly, the PhD scholars make specific concentration on the detailed study. These scholars can utilize this concept as a model in research. The second sloka or Sanhita of the Srimadbhagavatmahapurana also mentions tapatraya. It is stated as **तापत्रयोन्मूलनम्**। It indicates that the Bhagavat is capable to eliminate tapatraya i.e. three types of obstacles or miseries. In such a situation, we should recite the Bhagavatam and utilize its knowledge in our research. If you start to study it, it will give you a magic touch.

The Srimadbhagavatmahapurana starts with a prayer to parabrahma this way:

मङ्गलाचरण

जन्माद्यस्य यतोऽन्वयादितरतश्चार्थेश्वभिज्ञः स्वराट् तेने ब्रह्म हृदा य आदिकवये मुह्यन्ति यत्सूरयः ।
तेजोवारिमृदां यथा विनिमयो यत्र त्रिसर्गोऽमृषा धाम्ना स्वेन सदा निरस्तकुहकं सत्यं परं धीमहि ॥१॥

The first Sanhita of the Bhagavat explains the nature of Brahma. It starts with the second sutra of Vedantadarshan. The first sutra raises the issues about the nature of Brahma. It is *अथातो ब्रह्मजिज्ञासा* । Immediately, the second sutra seeks answer to the first issue related to the Brahma. It states: *जन्माद्यस्य यतः* This is the evidence to prove that the purana is the detailed explanation of the Vedantadarshanam. Another important aspect is that the purana includes Gayatri Mantra at the beginning and at the end. The sanhita at about the end is:

कस्मै येन विभासितोऽयमतुलो ज्ञानप्रदीपः पुरा तद्रूपेण च नारदाय मनये कृष्णाय तद्रूपिणा ।
योगीन्द्राय तदात्मनाथ भगवद्राताय कारुण्यतस्तच्छुद्धं विमलं विशोकममृतं सत्यं परं धीमहि ॥

There are a number of questions in the Bhagavat on the basis of which a detailed discourse is made. The major interaction is between King Parikshit and Shri Shukadev Swami. So the story of the whole Bhagavat is Parikshit-Shuka Sambad. In addition to this, there are many interactions among other characters like Suta-Shaunaka, Vidura Maitreya, Nimi-Yogiswara, Shrikrishna-Uddhava, Narad-Vasudeva, and many others. Thus, there are innumerable questions and issues raised in various cantos and chapters. However, the whole story of the Srimadbhagavatmahapurana starts with six major questions. They are presented here with the gist.

षट्प्रश्नाः

तत्र तत्राञ्जसाऽऽयुष्मन् भवता यद्विनिश्चितम् । पुंसामेकान्ततः श्रेयस्तन्नः शंसितुमर्हसि ॥१॥
भूरीणि भूरिकर्माणि श्रोतव्यानि विभागशः । अतः साधोऽत्र यत्सारं समुद्धृत्य मनीषया ।
ब्रूहि नः श्रद्दधानानां येनात्मा संप्रसीदति ॥२॥
सूत जानासि भद्रं ते भगवान् सात्वतां पतिः देवक्यां वसुदेवस्य जातो यस्य चिकीर्षया ॥३॥
तस्य कर्माण्युदाराणि परिगीतानि सूरिभिः । ब्रूहि नः श्रद्दधानानां लीलया दधतः कलाः॥४॥
अथाख्याहि हरेर्धीमन्नवतारकथाः शुभाः । लीला विदधतः स्वैरमीश्वरस्यात्ममायया ॥५॥
ब्रूहि योगेश्वरे कृष्णे ब्रह्मण्ये धर्मवर्मणि । स्वां काष्ठामधुनोपेते धर्मः कं शरणं गतः ॥६॥

The first question raises the issue about the means of welfare for living beings in the Kaliyuga. We can interpret it as 'What is the means of welfare for the living beings of Kaliyuga?'

The second question is associated with the gist of scriptures. The Shaunakadi ask -'There are so many scriptures to be studied but time is very short. So tell us the gist of all the Shastras.' The third question is related with the need and importance of Krishna as the incarnation of Vishnu. The fourth and the fifth

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questions are related with the works and pastimes of the Lord Krishna. The last question indicated about the position of Dharma after the end of Krishnavatar. These are the major questions stated in the first chapter of the First Canto of the Bhagavat.

Conclusion

Present paper was an attempt to explain the need of theoretical and conceptual framework in a research with specific example of demographic research. As the title of the paper indicates, the specific examples of tapatraya model and research questions stated in the Bhagavat have been included with short meaning. It can be concluded that there is a need of theory and model in carrying out research and that this idea can be generated through the knowledge of Srimadbhagavatmahapurana.

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Talk 2: (Hall 2)

Sprit and Science

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The secret rules of origin and destruction of the universe, world, micro-organisms, plants, animals and human beings is the spirit. When the universe is created and does it also destroy? Why and how man is born and dies? In the physical world every physical objects originates and destroys.

अनिच्चावत संङ्खारा, उप्पादवयधम्मिनो ।
उप्पज्जित्वानिरुज्झन्ति, तेसं वूपसोसुखो ।

Or, every "sanskar" are impermanent. It has nature of origin and destruction. All created objects are destroyed. Hence the process of being calm is called the real happy.

Science researches and studies physically. According to sciencebirth of man is due to only the fusion of ovum and sperm. Death comes due the decaying of the body tissue. Science does not include happy and misery of a man.There is no relation before and after death. Such relation including science is called spirit.

In the other hand, the study of god is called spirit. Actually the positive and good nature spiritual power is accepted as god and bad nature is evil. Existing God and evil proves existence of "Atma" the soul. As it is natural power then it is "Ana atma" or no soul.

The knowledge and study of spirit is introduced by different religions such as Hinduism, Christian, Budhhism, Muslim, Shikh etc. Due to this people are divided as Hindu, Budhist, muslim, Christian as so on. No one "Dharma" does not divide people it only unites. Unites by love and compassion. The dharma should be strong within a person but not it's title as Hindu or Christian.

Now, what is the pure Dharma. It is the universal truth. It is a "Sanatana" that is always being. So dharma is the law of nature, the property of objects and the "kartabya". Doing good is "Punnya" and doing bad is "Paapa".

सब्बपापस्स अकरण, कुशलस्स उपसम्पदा
सचित परयोदपनं, एतम् बुद्धानुसासन

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Or, stay far from all kinds of Paapa and accumulate Punnya. Keep your "Chitta" pure, this is the Buddhas' message. This main gem for human being is the spirit.

In same way man are divided in four "warna" or "Jati" . they are Bhrahmin, chhetri, Baisya and Shudra. In shastra it become to known that a body part like head is Bhrahmin, hands are chhetri, stomach is Baisya and lower reproductive and leg are Shudra. Such division is not supported by any science so how it may be a part of spirit.

न जच्चावसलो होति, न जच्चाहोति ब्राह्मण।
कम्मनावसलो होति, कम्मनाहोति ब्राह्मणो।

Or, Jati does not confirm shudraeighter it says Bhrahmin,
Due to karma it confirms Shudra and Bhrahmin.

There is no difference between your own house and your country. If you are good member of your family then you will be good citizen of the country. The brain drain should be stop from our country. Country should provide sufficient provability to work here. This is duty of leaders. If leaders makes wrong decision due by influencing their parties ego, it is "Adharma". To define and determine to act is also a part of spirit. To save and work for own country prosperity is nation-spirit.

Talk 3: (Hall 1)

CONTROL OF MIND – AN AYURVEDIC APPROACH

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ABSTRACT

Wikipedia defines mind as a set of cognitive faculties which includes consciousness, perception, thinking, judgment and memory. According to *Ayurveda* we can call it as Mana, which is a matter (dravya) responsible for the perception and not the knowledge. Mana is the bridge between the soul, body, sensory & motor organs. Due to the growing civilization of automation, the people of 21st century always live a stressful life and as the consequence they suffer from various mental disorders like Memory loss, Insanity, Epilepsy etc.

As the synthetically prepared modern drugs have many side effects and are habit forming, the use of herbal drugs and therapies got considerable popularization in recent era. The drugs like *Mandukaparni (Centella asiatica* Linn.*)*, *Yastimadhu* (*Glycyrrhiza glabra* Linn.), *Guduchi (Tinospora cordifolia* Willd.), *Sankhapuspi* (*Convolvulus pleuricaulis*), *Aswagandha (Withania somnifera Linn.)*, *Satavari* (*Asparagus racemosus* Willd.), *Brahmi* (*Bacopa monnieri*), *Kustha* (*Saussurea lappa* Clarke) ,*Vacha* (*Acorus calamus*) etc act very well on the mind. Ayurvedic therapies like *Shirodhara, Nasya, Abhyanga* etc. are also effective to control mental illness.

INTRODUCTION

According to Indian Philosophy, *Mana* is a ***dravya*** (Matter) which is responsible for the perception and not the knowledge. *Mana* is the bridge between the soul, body, sensory & motor organs. *Mana* Collects information through sensory faculties & carries them out through Motor organs.

In Ayurveda, the main cause of disease is said to be failure of the intelligence i.e. "Prajna-paradha." This is not simply lack of intellectual knowledge or verbal acuity, but a failure of natural wisdom. It is a lack of understanding of natural harmony with nature, the universe and divine. This failure of our natural intelligence to operate is caused by external conditioning factors like "fear", "anger" and "desire".

In this modern world most people are suffering from some disease or other, all these are the result of bad food combination that we eat, lack of nutritious food, and no exercise at all. Among the diseases most of them are found to be related with psychiatric disorders or personality disorders.

PREVALLENCE OF MENTAL DISORDERS

The United States, Colombia, the Netherlands and Ukraine tended to have higher prevalence estimates across most classes of disorder, while Nigeria, Shanghai and Italy were consistently low, and prevalence was lower in Asian countries in general. Cases of disorder were rated as mild

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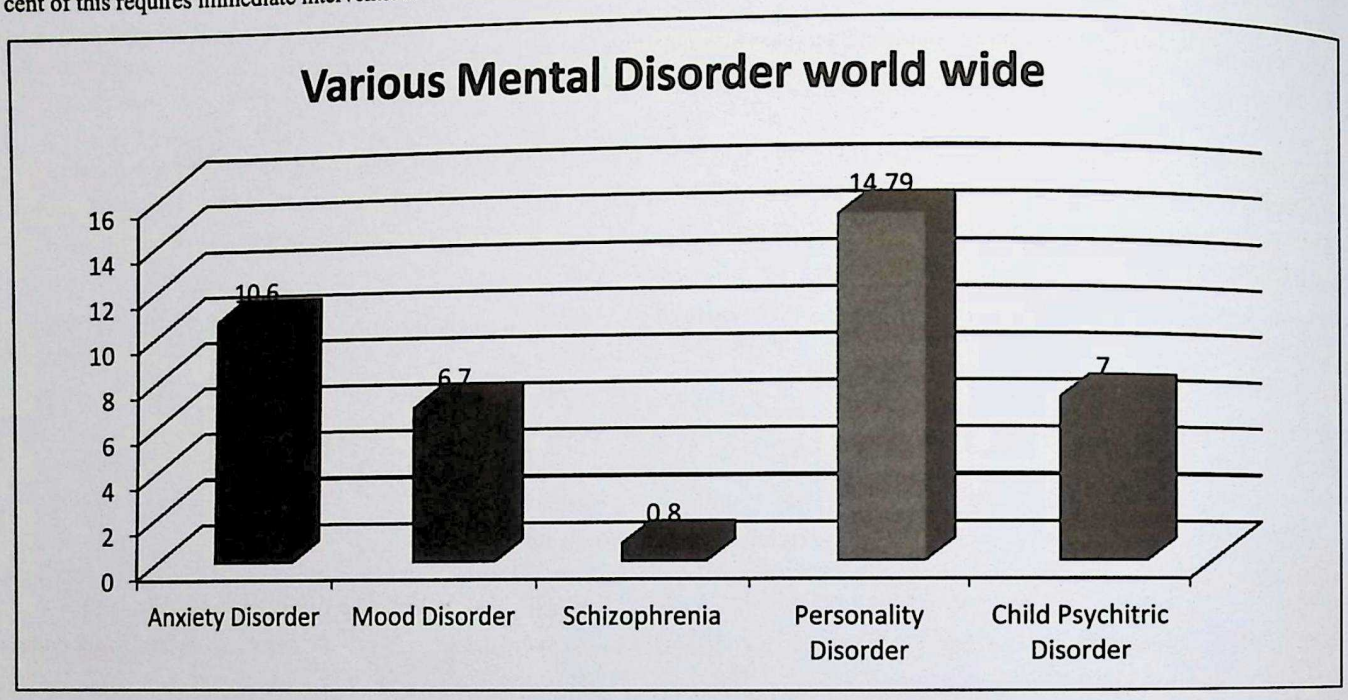
(prevalence of 1.8%–9.7%), moderate (prevalence of 0.5%–9.4%) and serious (prevalence of 0.4%–7.7%). The World Health Organization has published worldwide incidence and prevalence estimates of individual disorders. Obsessive-compulsive disorder is two to three times as common in Latin America, Africa, and Europe as in Asia and Oceania. Schizophrenia appears to be most common in Japan, Oceania, and South Eastern Europe and least common in Africa. Bipolar disorder and panic disorder have very similar rates around the world.

A countrywide National Institute of Mental Health & Neurosciences (NIMHANS) study has revealed a shocking prevalence of mental illness in India. At least 13.7 per cent of India's general population have been projected to be suffering from a variety of mental illnesses; and 10.6 per cent of this requires immediate intervention.



CAUSES OF MENTAL DISORDERS

धी :धृति :स्मृतिविभ्रंश कर्म यत् कुरुते अशुभम|
प्रज्ञापराध तं विद्यात् सर्वदोष प्रकोपणम् ||)च.वि(

Mana is the seat of diseases, *Prajñāparādha (*violation transgression) is the main causative factor in psychological diseases. Ayurveda describes *Manasika* rogas like- *Unmada*, *Apasmara*, *Atattwabhinibesha* etc. which can be co-related with insanity, epilepsy and hysteria respectively.

SYMPTOMS RELATED TO MENTAL DISORDER

Ayurveda research shows that many physiological imbalances contribute to depression, anxiety and related conditions.

Symptoms of depression and anxiety are triggered by excessive mental and physical stress, or disruptions of natural biological rhythms. According to Ayurveda, psychological problems start when fundamental imbalances develop in the biological intelligence that controls all bodily processes.

- Vata imbalance contributes to anxiety, fear, mental instability and insomnia
- Pitta imbalance may give rise to anger and irritability
- Kapha imbalance may lead to lethargy and depression

Ayurveda does not simply match drugs to symptoms, because people can have the same symptoms for different reasons. Just as a headache can have many possible causes, not everyone has depression or anxiety for the same reasons. Most illness, including depression, begins when toxins accumulate in tissues and disrupt the body's delicate biochemistry.

MANAGEMENT

Since depression and anxiety can be influenced by many factors, such as diet, digestion, toxin accumulation, stress, exercise levels and daily routine, The Ayurvedic treatments balance many physiological functions simultaneously.

Ayurveda advocates three dimensional approach to treat mental disorder, i.e.-

i) Daivya vyapasraya (Spritual)
ii) Yukti vyapasraya (Rational)

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iii) Satwavayaya (Psychological)

Herbal Drugs that affect the Mind

A) ***Medhyarasayana*** **(Intellect promoting drugs).**

1. *Mandukaparni (Centella asiatica* Linn.*)* juice
2. *Yastimadhu* (*Glycyrrhiza glabra* Linn.) powder
3. *Guduchi (Tinospora cordifolia* Willd.) juice
4. *Sankhapuspi* (*Convolvulus pleuricaulis*) paste

B) Other important drugs:-

1. *Aswagandha (Withania somnifera Linn.)* 2. *Satavari* (*Asparagus racemosus* Willd.), 3. *Brahmi* (*Bacopa monnieri*), 4. *Kustha* (*Saussurea lappa* Clarke) and 5. *Vacha* (*Acorus calamus*) 6. *Tulasi (ocimum sanctum) etc....*

Therapies that affect the Mind

1. Shirodhara 2. Siropichu 3. Abhyanga 4. Nasya 5. Sarvangadhara

CONCLUSION

In Bhagavad Gita, it is stated that, man is a tree having branches downwards (Ulta Vrikhya) and head as the root of this tree situated upwards ऊर्ध्वमूल मधोशाखा अश्वत्थ .....For maintenance of this tree, we have to take care of the root of the tree i.e. head of the man through irrigation, nutrition, foods etc. In Ayurveda, we have lots to do for the head like herbs, therapies and different ayurvedic approaches. The details will be discussed in the seminar.

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6. K.C. Chunekar & K.K. Basu: Bhava Prakash Nighantu
7. Haridas Kasture: Ayurvediya Panchakarma

Talk 3: (Hall 2)

CONSCIOUSNESS STUDIES AND QUANTUM MECHANICS

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Abstract

The limitations and unsuitability of the twentieth century intellectual marvel, the quantum mechanics for the task of unraveling working of human consciousness is critically analyzed. The inbuilt traits of the probabilistic, approximate and imprecise nature of quantum mechanical approach are brought out.

The limitations and the unsuitability of using such knowledge for the understanding of precise, correct, finite and definite happenings of activities relating to human consciousness and mind, which are not quantum in nature, are pointed out.

Analytical methods interpreting philosophical and Indian spiritual analyses suiting the unraveling of working of human consciousness and mind over the deductive approach of quantum physics and advanced mathematics are highlighted. A model of human consciousness and mental functions is presented taking ideas from the Upanishads and related texts.

Comparisons with theological interpretations of *Upanishadic* insight are dealt with to have an idea of working of human consciousness and mind in relation to spirituality.

Key words: human consciousness and quantum mechanics; theological interpretations of Upanishads and related texts

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Introduction

The study of the human consciousness, mind, their nature, structure and function is generally believed to be a subject matter outside the realm of the disciplines of physics and chemistry (Taylor and Green, 2002). Others feel that the study of human consciousness belongs to the domain of philosophy and psychology and concepts of physics and chemistry are not sufficient enough to explain the nature, structure and function of human consciousness. Such *feelings* convey that the consciousness of living organisms certainly cannot be described in terms of physics and chemistry, even though the neurophysiologists can describe the working of the single neuron in physicochemical terms.

Scientifically, human consciousness, knowing, perception, reasoning, intellectual abilities, understanding, experience etc., are mental processes of the vertebrate human-being, belonging to *Homo sapiens* species. Thus human mental processes are biological, involving physicochemical energy transitions and transformations relating to brain, spinal cord and the nervous system (Guyton and Hall, 2004), Blakemore, 1977).

Mind, which is an expression and part of consciousness, is an aspect of human body. Mind does all human mental functions which are physiological processes. Thus psychology is physiology.

As visualized by some, consciousness is the collection of millions of neurons and their electrochemical states, even if we have no real knowledge of chemical nature of thoughts and ideas. According to them, we neither have understood completely how living organisms originated and evolved. They feel that we may not be able to define precisely what life is nor whence it came from. All that we can do according to them is to describe the observable phenomena that distinguish living from non-living matter.

Mathematics and modeling by computational activity can explain understanding and consciousness. About 2300 years of philosophy, 100 years of mathematical logic and 50 years of computational intelligence have been trying to understand human consciousness and model its form and function, and still a clear model is eluding scientific community (Perlovsky, 2001-chapters 11and 12). Theorems and other concepts developed by Gödel, Turing, Penrose and Putnam on mind and machine have not been sufficient to model intellect, understanding, experience and other mental processes. (Perlovsky, 2001) and Penrose (Perlovsky, 2001) sustain that the brain activity responsible for conscious understanding must depend upon a *physics* that lies beyond computational simulations.

Further, we are yet to formulate neural structures of consciousness. "The Physics of spiritual substance" is yet to be proposed and develop. We have also to understand the physics of the nature of free will and the creativity mysteries. We have also to probe and determine whether consciousness is a hitherto not known new physical phenomenon or otherwise. A future direction for this research lies in the path to understand the physical nature of the symbol and emergence of consciousness using many sources including spiritual expressions..

Many are also trying to bring in quantum mechanics to unravel the working of human consciousness and mind and various types of approach to understand human consciousness are proposed and discussed. In addition to scientific approaches spiritual and theological approaches are also being considered (Sadhu Sanga e-communications, 2017). A correlation of these various propositions and discussions will be inherently influencing the studies on human consciousness and mind. Theological expressions may be tried to aid these studies.

This paper deals just with the limitations and unsuitability of quantum mechanical approach in human consciousness studies.

Upanishads, quantum mechanics and Vedanta:

Ancient Indian wisdom as revealed in the *Upanishads* has a lot to say about human consciousness (Radhakrishnan, 1994, Ramabrahmam, 1997, 2004, 2005a, 2005b, 2007a, 2014, 20016). The expressions of the *Upanishads*, when translated into the modern scientific terms will benefit the fields of physiological psychology; the natural language comprehension branch of artificial intelligence, and the modeling of human cognition, language communication and understanding processes. In addition the expressions of seers and *Vedantins* can also be analyzed.

Spirituality is physics, chemistry, biology and beyond.

It is the philosophical belief of the physicalists that a phenomenon has to be reduced to its smallest components to achieve a complete explanation. This is generally interpreted as meaning that explanation could be achieved only at the lowest level of organization. This conclusion would be particularly disturbing for biologists, *because at the lowest levels of organization such a reduction abandons biology, human consciousness, mind and subtleties of their working and deals exclusively with physical phenomena.*

This is one limitation of quantum mechanics.

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However such reduction is not only not necessary but indeed quite impossible in consciousness studies. The support for reduction is in part the result of confusion with the process of analysis (Mayr, 2005). Analysis is and always will be an important methodology in the study of complex systems. Reduction, on the other hand, is based on invalid assumptions and should be removed from the vocabulary of science (Mayr, 2005). *In many processes of biology like consciousness studies, ageing; theoretical physics solely has no role to play. Any physical theory clubbed with chemistry and in finite times with finite velocities only will succeed with phenomena relating to human consciousness and mind. Phenomenon dealing with fundamental particles and energy particles represented by a wave function and probability of happening by integrating in tau space the wave function and its complex conjugate must be suitable in tiny dimensions of space, matter and time which only is the range of quantum mechanical approach.*

Mental conjectures in modern physics and cosmology in terms of time and energy:

Worm-holes; black holes; white holes; time travel; twin paradox; time dilation; singularities; real and imaginary components of time; big bang; big crunch etc., is the vocabulary that dominates the discussion of nature of time (Stephen Hawking 1989, 2001), Peter Covency and (Roger Highfield 1991). The quantum cat paradox, Wigner's friend, parallel universes, the EPR paradox, which deal with quantum mechanics make the understanding of nature of time further confusing than clarifying (Peter Covency and Roger Highfield 1991).

These attempts to express the nature of time using advanced mathematics seem more as intellectual exercises and the propositions based on them as mental pictures confined to the realm of happenings concerning the universe or quantum mechanics than explaining physical realities actually present in the universe, especially on planet earth as studies in various disciplines and fields like chemistry and biology.

The modern mathematical approaches to understand time and hence transformation are partial, non-cohesive and piece-meal (Ramabrahmam, 2005a, 2007a, 2013b, 2013c). Nature of time understood by modern physicists and cosmologists as above has no use for understanding of time as *evolving* and *constructed* in chemical and biological systems which includes consciousness studies. The *relational view of time* that time is also a concept, and therefore dependent on consciousness, but at the same time it is a function of the events happening in.

A brief review of quantum mechanics:

The quantum mechanics is developed to deal with the inorganic phase of matter based on uncertainties confined to fundamental particles and energy quanta- i.e., to deal with the dual nature of matter and energy, which travel with the velocity of light;

The term 'quantum' refers to discrete units that the theory assigns to certain physical quantities, such as the energy of an atom at rest. The discovery that waves could be measured in particle-like small packets of energy called quanta led to this branch of physics i.e., quantum mechanics that deals with atomic and subatomic systems. It should be noted that quantum mechanics can be used to understand only the behavior of systems at atomic length scales and smaller.

In the formalism of quantum mechanics, the state of a system at a given time is described by a complex wave function (sometimes referred to as orbitals in the case of atomic electrons), and more generally, elements of a complex vector space. This abstract mathematical object allows for the calculation of probabilities of outcomes of concrete experiments. Heisenberg's Uncertainty Principle quantifies the inability to precisely locate the particle.

The other exemplar that led to quantum mechanics was the study of electromagnetic waves such as light. While quantum mechanics described the world of the very small, it also is needed to explain certain "macroscopic quantum systems" such as superconductors and super-fluids. Broadly speaking, quantum mechanics incorporates four classes of phenomena that classical physics cannot account for: (i) the quantization (discretization) of certain physical quantities, (ii) wave-particle duality, (iii) the uncertainty principle, and (iv) quantum entanglement.

These phenomena have no application in consciousness studies as consciousness is the result of breathing process as is envisaged by Upanishadic seers and other theological interpreters and is solely classical in nature in relation to energy transformations and organic nature of matter simultaneously existing in all phase of matter..

Wave functions – probability distributions and Uncertainty Principle: Limitations of quantum mechanics in conscious studies:

Wave functions are functions of both time and space and can change as time progresses. An equation known as the Schrodinger equation describes how wave functions change in space and time, a role similar to Newton's second law in classical mechanics. The Schrodinger equation, applied to our free particle, predicts that the center of a wave packet will move through space at a constant velocity, like a classical particle with no forces acting on it.

However, the wave packets will also spread out as time progresses, and this means that the position becomes more uncertain. This also has the effect of turning position *eigen* states (which can be thought of infinitely sharp wave packets) into broadened wave packets that are no longer position *eigen* states.

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Some wave functions produce probability distributions that are constant in time. Many systems that are treated dynamically in classical mechanics are described by such "static" wave functions. The time evolution of wave functions is deterministic in the sense that, given a wave function at an initial time, it makes a definite prediction of what the wave function will be at any time. During a measurement, the change of the wave function into another one is not deterministic, but rather unpredictable, i.e., random.

Thus the choice of wan functions – to choose, time dependent or time independent – wave functions will be major obstacle in the application of quantum mechanics as consciousness studies deal with both space and time consciousness. And randomness has no use for the precise working of human consciousness and mind.

In relation to working of human consciousness and mind; the energies taking part are not quantized nor the matter involved is neither particle nor have a wave function representation - as electron – and in nature – actually exists simultaneously as solid, liquid, gas and plasma phases – and does not travel with the velocity of light.

Another quantum effect is the uncertain principle, which is the phenomenon that consecutive measurements of two or more observable may possess a fundamental limitation on accuracy. In our free particle example, it turns out that it is impossible to find a wave function that is an eigen state of both position and momentum. This implies that position and momentum can never be simultaneously measured with arbitrary precision, even in principle; as the precision of position measurement improves, the maximum precision of the momentum measurement decreases., and vice versa. Those variables for which it holds (e.g., momentum and position or energy and time) are canonically conjugate variables in classical physics. It means that energy and time also cannot be simultaneously accurately measured.

But in relation to working of human consciousness, mind and related mental functions all the happenings and events are classical i.e., the energies transform or change continuously and matter exists in all the four phases simultaneously and neither matter nor energy is dual in nature in these studies and is purely classical in nature

Classical description is also a view of nature. However the classical picture finds a limit in the quantum domain. However scientists do not know what to replace it with. This aspect of Reality, i.e. the classical limit as well as non-immutability of the particle view of nature should be discussed. It is a major issue in Science today. However consciousness cannot be modeled in this way considering the dual nature of matter and or energy. Really consciousness is coming from the *Atman/Brahman.*

Under other conditions, the same type of objects exhibit wave-like behavior, such as interference. We can observe only one type of property at a time, never both at the same time. And this suits the classical nature of human mental functions whereas quantum approach has limitations in observing the existence of one of ***position or momentum*** *or* ***time or energy.***

Another quantum effect is quantum entanglement. In some cases, the wave function of a system composed of many particles cannot be separated into independent wave functions, one for each particle. In that case, the particles are said to be "entangled". If quantum mechanics is correct, entangled particles can display remarkable and counter-intuitive properties. For example, a measurement made on one particle can produce, through the collapse of the total wave function, an instantaneous effect on other particles with which it is entangled, even if they are far apart.

The quantum mechanical approach, though is successful in describing the motions of fundamental particles and photons, it will be of no use while dealing with the macroscopic and microscopic physicochemical changes associated with various types of conscious happenings in the observation of consciousness.

Human consciousness modeled divorced of biological, species basis and spirituality will not be truthful.

As mentioned in events of consciousness studies matter simultaneously exists in different phases as solid, liquid, gaseous or vapor or ionic and actions and interactions take place among such phases and the forms of energy involved are also of varied kinds. Sizes, types and phases of matter, changes, time-periods, energies and energy transitions associated with different biological materials and methods used to monitor various biological phenomena are not the same Not only different physical techniques are necessary to monitor various changes in bio-systems but also the energies to probe the various aspects of consciousness processes are not the same (see also Figure II).

Thus quantum mechanics deals with the motion of fundamental particles and energy quanta, their transmission, absorption and transfer through matter or vacuum. The velocities associated and the sizes of particles/photons are not comparable to the neuron signal transmissions which happen in ionic phase through liquid medium.

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Quantum mechanics at present is not in the stage of clubbing these ionic-matters and energy-forms (electro-chemical and mechanical) which are classical rather than "quantal". It is also not known whether these transmissions are analog or digital. The time-periods and nature of energy transfers or transformations of these happenings are more nearer to classical transformations rather than quantum transformations at the gross level. We all know the energy transformations involving quantum processes are discrete in nature. But neural transmissions are continuous in nature.

The probabilistic nature of quantum mechanics thus stems from the act of measurement. This is one of the most difficult aspects of quantum systems to understand. And quantum mechanics could not explain spectra beyond hydrogen atomic spectrum.

Depending on such a method where and when the matter and energies involved are in classical range and the energy transformations are not quantum in nature, the quantum mechanical approach to understand human consciousness has limitations and is unsuitable in the infrasonic, chemical, physical, electrochemical energy reversible transformations which constitute the working of human consciousness and mind (Ramabrahmam, 2007, 2013, 2016).

***Upanishadic* and Vedanta Awareness of functioning of human consciousness and mind:**

As Continuous Conscious Awareness, the *Self* witnesses all our mental activities, related body activities and happenings within and without body and body's reactions as thoughts and organ-movements to these happenings. Being such an Awareness, *Atman* also provides the energy required for guiding the mind to know/cognize/learn through sense organs, perceive, think, experience, understand, etc., and store such an information and retrieve the same in the conscious states described above and makes us conscious of ourselves and within and without ourselves (Ramabrahmam 2004, 2007a, 2007b) (Concept Diagram II).

The *continuous and simultaneous or alternate rise and set of the conscious states or phases of mind is an aspect of psychological time and its flow and quantum ideas have no role to play in these classical processes.*

However such a statement as above as atman as the result of breathing process is misleading for some as consciousness is not considered as a direct product of breathing process. However it can be said that the phenomenological consciousness is having a relation with the breathing process. For example it is stated that consciousness is floating on the subtle airs. (https://www.vedabase.com/en/sb/11/3/39)

Atman (***yasya gamanam satatam tat atma***) and *maya* (***yaya asantam pasyati sa maya*** or ***ya ma sa maya***) together constitute and compose of human consciousness and are the ingredients that construct and operate human consciousness and human mental functions)[8].

*poornam **adaha** pooram **idam** poornat pootnam udachyate*
poornasya poornam aadaya poornam eva avasisshyate

The above *Upanishadic* expression informs about *Atman* ***(adaha or aham)*** and ***idam***, the inner mental world and mental functions taking place therein. ***Idam*** comes out as full from ***adaha*** – the full and after this release the ***adaha*** remains full. This means ***adaha*** or ***Atman*** or ***Brahman*** is both the instrumental and substantial cause (***upaadaana kaarana***) for the formation of inner mental world. ***Atman*** also gives us ***dristi*** or consciousness. ***Atman***, which moves always, rather oscillates in tune with the breathing process and is the result of it[8], is both the source, guide of and absorber of ***maya***, the ***chit aabhaasa or pranavam***, the reflected form of the ***chit*** energy. And inner mental world is constructed by ***maya*** and associated mental functions are transformations of ***maya*** in forward and reverse directions, technically known as ***vivartanam***. ***"mayaamayam idam jagat"*** sentence informs this. [In *Vaishnava* tradition, *Sree (Lakshmi)* assumes the role of *maya*]. Both *maya* and *Sree* are energy forms of the Lord/*Brahman/Siva/Vishnu.*

The following are relevant *Brahma Sutras*, *Vishnu Sahasranaamas* which further aid and clarify present article and enhance the understanding:

Brahma Sutras:

Athaato brahmajignaasa;
Jnamaadi asya yataha;
Saastra yonitvaat ;
Tat tu samanvayaat

Vishnu Sahasranaama:

Aanadi nidhanam vishnum sarvalokamaheswaram
Lokaadhyaksham stuvannityam sarvaduukaathigo bhavet;

Brahmanyam sarvadharmajnam lokaanaam keertivarthvardhnam
Lokanaadhan mahadbhootam sarvabhootabhavodbhavam;

Yataha sarvvani bhootaani bhavantyaadi yugaagame

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Yasmin cha pralayam yaanti punareva yuga kshaye;

Yasya smarana maatrena janma samsaara bandhanaat
Vimuchyate namaha rasyai vishnave prabhavishnave

Conclusions:

The aid of philosophical insights of consciousness and mind and its functions available in eastern and western systems have to be taken as presented in this article In view of its essential nature and features – wave functions, wave-particle duality of matter and energy-dealing with only inorganic phase of matter; and various quantum effects, produced; discussed in this paper, not suiting classical behavior of matter being present in all phases and classical energies - mechanical, chemical, electrochemical, biochemical, transforming continuously, thus classically-dealt with quantum ideas have no role to play in consciousness studies.

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Talk 4: (Hall 1)

Spiritual Essence of Evolution

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Introduction

The study of the living world is complex and chaotic. No two organisms are alike and the same organism can change from time to time. Till Darwin came on the scene biology seemed to defy the logic that physical scientists appreciate. In fact such was the sense of order that Darwin's theory of evolution brought to the biology that Christian Theodosius Dobzhansky wrote a famous essay titled **"Nothing in Biology Makes Sense Except in the Light of Evolution"** [1] criticizing anti-evolution creationism and espousing theistic evolution. Apart from being an evolutionary biologist he was a devout Eastern Orthodox Christian.

Evolution is a convenient concept as it explains the interrelatedness of the various facts of biology, and so makes biology make sense [2]. However Darwin's physical evolutionary theory which fails to consider the spiritual essence is missing the plot. Dobzhansky [3] went on to declare "Evolution is God's, or Nature's method of creation."

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Dharmic Concepts and Evolution

Evolution as a western concept appears to be quite modern with the first serious theory of evolution to be proposed by the French scientist Lamarck in 1830 [4]. The theories of evolution give deep consideration to the physical characteristics. Yet I feel as a student of biology that the concept of the soul has never been considered in evolution.

If one were to consider the soul the dharmic concept of evolution with the concept of karma and the cycles of rebirth is probably as old as recorded history. **Rebirth** is the philosophical concept that an aspect of a living being starts a new life in a different physical body or form after each biological death [5]. Modern theories of genetic transmission of inheritance give a physical evidence of aspect of a living being carrying on to a new life

Dashavatar and the evolutionary history of life

The evolutionary history of life on Earth traces the processes by which living and fossil organisms have evolved since life appeared on the planet, until the present day.The similarities between all present-day organisms indicate the presence of a common ancestor from which all known species have diverged through the process of evolution [6]. From the single cell through fish, reptiles, primitive hominids to modern man the history of evolution of man goes on [7]. That man evolved from simpler beings was something both heretical and revolutionary to the west.

Yet those familiar with the Dashavatar or the ten incarnations of Vishnu would find such an evolutionary history of man a bedtime story they grew up with. Dashavatar starts with Matsya avatar or the fish goes on to the reptilian avatar of Kurma. Mammals like Varaha Avatar follow. The early hominids are represented by the dwarf Vaman Avatar. The Neanderthals by Parasuram. Ram the early civilized man evolves to Kalki the postmodern man. Dashavatar is evolution of man in a nutshell.

Karmic Evolution

In a background of descent to disorder the living being has the opportunity to evolve on the physical and the spiritual plane. Darwin considered natural selection [8] as improved survival of organisms with traits that best adapted to the environment. This was survival of the fittest. Replace the physical with the spiritual and we return to a familiar dharmic concept of Karma. A parallel to the concept of natural selection. **Karma**, the spiritual principle of cause and effect where intent and actions of an individual (cause) influence the future of that individual (effect) [9] is closely linked to the cycle of rebirth. While nature selects the most desirable physical traits the cycle of rebirth guided by karma selects the spiritually most desirable traits. While natural selection is an automatic process with no conscious intent applied Karma is very much based on free will and conscious intent. I will venture a personal opinion here and say the dharmic theory of karma thus is a more comprehensive theory than physical evolution.

Genes and Karmic Memory

A **gene** a locus (or region) of DNA which is made up of nucleotides, is considered as the molecular unit of heredity [10]. Julian Huxley in the 1940's integrated the concept of genes with evolution [11]. George C. Williams' proposed an evolutionary concept of the gene as a unit of natural selection [12]. Genes have now become a fundamental basic in biology and evolution. Genes are inherited across generations. We humans still carry genes that first made an appearance in protozoa. Genes code for physical and personality traits. While these appeared as revolutionary ideas but a generation ago, Dharmic tradition has long held a Karmic inheritance.

Hinduism in particular has held the spiritual influence of ancestors on an Individual. The Pitris or ancestors can influence by their own karmic balance. A Pitra dosha in a native's horoscope is a clear example where the negative karmic balance of one's ancestors casts negativity on a native's life.It is a Karmic debt of the ancestors which the native having Pitra Dosh in his horoscope is supposed to pay [13]. Atavism as an evolutionary throwback, such as traits reappearing that had disappeared generations before appeared in the west in 1870's.There has even a case reported of a human with coronary circulation resembling that of a snake's heart [14]. Atavism has moved on to social sciences too.Social Darwinists claimed that inferior races displayed atavistic traits, and represented more primitive traits than their own race [15].

Ontogeny recapitulates Phylogeny

The Jātaka tales (Sanskrit: जातक, birth history') are a voluminous body of literature native to India describing the previous births of Gautama Buddha in both human and animal form [16]. The Buddha may appear as a king, an outcast, a god, an elephant—but, in whatever form, he exhibits some virtues.

In a parallel to the Buddha going through various stages of existence but with the same spiritual essence, the theory of recapitulation, also called the biogenetic law or embryological parallelism was described. Ernst Haeckel's phrase [17] "ontogeny recapitulates phylogeny" described the biological hypothesis that the development of the embryo, from fertilization to gestation or hatching (ontogeny), goes through stages resembling or representing successive stages in the evolution of the animal's remote ancestors (phylogeny).

Evolution and Law of Physics

Physics rests on the bedrock of the laws of thermodynamics which all processes in nature obey. Max Planck simplified the second law of thermodynamics to state [18] "Every process occurring in nature proceeds in the sense in which the sum of the entropies of all bodies taking part in the process is increased" . Entropy is considered a measure of disorder. In other words all processes in nature proceed from order to disorder in the absence of an external stimulus. Just as entropy increases in the physical world by default, the cosmos on a dharmic plane is in a state of progressive spiritual degeneration from Yuga to Yuga. We are unfortunately in the most degenerate Kali Yuga.

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Yet Evolution is the exact reverse where in disorder proceeds to order. Evolution would thus seem at odds with the Second Law of thermodynamics unless we consider an external stimulus or energy to the system. Could we label this energy the divine presence?

If we do not consider the external stimulus or energy, God or whatever name you may choose, evolution cannot be reconciled with the laws of Physics.

Conclusion

Classical evolution a brilliant attempt at explaining the chaotic world of nature has many flaws. It does not consider the central force behind evolution and natural order or God if you would like to say. Without a divine force the natural order breaks the laws of physics. Evolution is yet to fully consider the social, behavioral and spiritual aspects of life and the bearing they have on the physical world. Many concepts of evolution were well known principles in Dharmic tradition. The modern biologist may yet find many concepts of Dharma worth future study

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Complex Systems Approach to the Hard Problem of Consciousness

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"Our minds thus grow in spots; and like grease-spots, the spots spread. But we let them spread as little as possible: we keep unaltered as much of our old knowledge, as many of our old prejudices and beliefs, as we can. We patch and tinker more than we renew. The novelty soaks in; it stains the ancient mass; but it is also tinged by what absorbs it. Our past apperceives and co-operates; and in the new equilibrium in which each step forward in the process of learning terminates, it happens relatively seldom that the new fact is added RAW. More usually it is embedded cooked, as one might say, or stewed down in the sauce of the old."
~William James

In a paper in *Darwin under Siege*, Bhakti Niskama Shanta talks about the inadequacies of current scientific approach in exploring subjectivity, the self-conscious perspective, proposing the need for "completely different rational approach...to understand further how conscious beings experience things and how they make their choices." (Shanta 2013)Consciousness has been the bone of contention for philosophers throughout centuries. Indian philosophy largely adopted lived experience as the starting point for its explorations of consciousness. For this reason, from the very beginning, experience was an integral way of grasping consciousness, whose validity as a tool was considered self-evident. Thus, in Indian philosophy, the question was not to move from the brain to mind but to understand experience of an individual and how such an experience is determined through mental structures (and secondarily, the preoccupation with the brain and its relation to the mind)[30]. In contrast, cognitive science (the study of mind and cognition through interdisciplinary methods, with emphasis on computational methods) found its debates soaked in discussion which primarily involved the brain and mind. Experience was not considered a primary source of information and its validity had to be established to consider it a source of information of mind. With the rise of physicalism and realization that mental states are correlative to brain states, the body was virtually neglected from involvement in understanding the mind and the attempts to reduce mind to the brain were rampant. The inability to explain subjective experience of an individual through neuroscientific findings alone has urged philosophers to explore other ways of understanding the ontology of mind. Over the last few years, embodied cognition and enactive approach have brought back the body as a central participant in this debate, providing fertile grounds to explain the relation of brain, body and mind.

This paper proposes that we understand the brain as a complex system from which the mind emerges. This emergence is marked by the development of novel property of self-consciousness in human beings. The mind is a process which is embedded throughout the body and thus, the body acts as an actualizing medium for the individual. Thus, the brain is a necessary condition for the mind to be while the mind is embedded throughout the body. The brain and mind are in reciprocal causal relationship with one another, as is the body and environment with one another. In this paper, embodied cognition is understood through principles of MerleauPonty's idea of embodiment, than through Andy Clark and Francis Varela's alone. To the question which is central to the conference, *Is science able to explain the scientist?*: beginning with the way in which science is defined (what is the criteria for scientificity?), the complex systems approach and emergence claims that the novel property, that of subjectivity, which belongs to the scientist and is embedded throughout her body cannot be reduced to study of any specific organ (including the brain) or explained/predicted through theories of lower-level components. More importantly, the complex systems approach and emergence allows us to understand Brahman as the ultimate Reality, as the emergent structure of our world. Each of us is perceived as embodying the form of Brahman, though the realization of this form only arises through self-knowledge and experience of the self.

This paper is divided into five parts: the first part introduces the easy and hard problem of consciousness: definition of consciousness and why the hard problem of consciousness is considered *hard*. This will include the introduction to qualia. The second part will be a short note on the complex systems approach (CSA) and the notion of emergence. This is followed by an explanation of consciousness from the CSA where the treatment of easy problems of consciousness is explicated. With the fourth section, we reach the central part of the paper: qualia. This will provide a detailed overview to the workings of mind, its structure (world-orientation) and the emergence of experience, thus forming a preliminary to dealing with the hard problem. In the fifth

[30] This is at no level to suggest that Indian Philosophy did not delve deeply into the relation between brain and mind (Chennakesavan 1980; Mohanty 1980). This only indicates that the starting points for Indian philosophy and cognitive science at large were different, thus leading to varying questions and ways of reaching answers.

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section, the concepts laid out in the previous sections are pieced together to respond to the hard problem with a concluding remark on where we can access qualia of the other.

PART 1: WHAT IS CONSCIOUSNESS?

1.1. HEURISTIC DEFINITION OF CONSCIOUSNESS

An exploration of easy and hard problem of consciousness can be discussed reasonably with acknowledgement of the amount of ambiguity and concerted efforts which have been directed towards defining consciousness over the years. This is the case in almost every discipline which is concerned with exploring the mind. Largely, consciousness can be seen as a property of the subject or of mental states.

A. As a property of the subject, consciousness is understood commonly as the state where a creature is awake and thus, senses and responds to the environment. It can also be said that a creature is conscious when it is aware of an other (it is conscious of something).

B. As a property of mental states, a mental state is said to be conscious when it figures in the *stream of consciousness* of the subject. Here, the implications of considering consciousness a *stream* are debatable. It is used here largely to indicate the contrast between the former and latter sense of consciousness.
In the former sense, consciousness is considered to be property of a creature as a whole where the sensing and responding is directed towards an object x: a subject A is conscious if it senses and responds to an object x. Here, the criteria for being conscious is to sense and respond to the object. In the later sense, consciousness is considered a property of mental state (hope or desire or anger) when the subject undergoing it becomes aware of it- there is a mental state m such that the subject possessing it is conscious of it if and only if..... Here the criteria can be self-consciousness or others.

In philosophy of mind, consciousness is generally received in the latter sense where it is considered a property of mental states. There can be conscious or unconscious or non-conscious mental states. Our purpose is to find under what conditions a certain mental state can be considered conscious, how such a consciousness of mental state can be understood using suitable tools and why a subject becomes conscious of x and not-of-y. Largely, the first two are housed as easy problems of consciousness while the third one inhabits the hard problem of consciousness.

While it is true that defining consciousness is an overwhelming task, it is important to begin with a definition of consciousness which will clearly direct course of the paper. For this reason, I will be starting with a heuristic definition: consciousness is the capacity to sense and respond, owing to the ability to distinguish oneself from the environment. Consciousness is interchangeably used with self-awareness. By understanding consciousness in this way, we will be able to do the following:

A. Consider levels of consciousness in correspondence to the levels of complexity of a system (with brain featuring as a highly-complex one), thus making space for mentality of animals;

B. Explore the possibility of artificial intelligence while keeping intact the crucial property of identity of an individual;

C. Understand mental states as inherently actualised through the body (clearing, initially at least, the risk of ontological dualism): since every movement of sensing and responding is the expression of mental state of the system.

Thus, consciousness is the capacity to sense and respond, owing to the ability to distinguish oneself from the environment. Systems which surpass a certain level of complexity exhibit spatiotemporal integrity through boundary conditions and have mechanisms to sense and respond effectively to the environment. These systems are considered to be latently conscious at all times and actively conscious when they are sensing and responding to the environment.

1.2. EASY AND HARD PROBLEM OF CONSCIOUSNESS

In his paper "Facing Up to the Problem of Consciousness" (Chalmers 1995), David Chalmers introduced the distinction between easy and hard problem of consciousness[31]. The easy problems of consciousness are those which are "are straightforwardly vulnerable to explanation in terms of computational or neural mechanisms." (Chalmers 2010). These include but are not exhaustive of: capacity to discriminate, classify and respond to the environment, cognitively integrating information, reporting of mental states, the power to access one's own states and others.

The hard problem of consciousness is the subjectivity involved in what-we-experience. The process of perceiving the world and thinking about it is accompanied by an inseparable subjective element. This is also labelled as qualia, the qualitative character of an experience. In Nagel's terms (Nagel 1974), *what-it-is-likeness* of a conscious system. In the next section, we will explore why the hard problem of consciousness is considered *hard*.

[31] In his paper, Chalmers does not begin with a definition of consciousness, as his purpose was to delineate what has been considered the hard-problem about consciousness itself, within philosophy of mind, in line with the various ways in which it has been defined. For this reason, this paper picks up the distinction and tries to see if within the complex systems approach and emergence, the hard problem can be addressed adequately.

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1.3. THE HEURISTIC DEFINITION AND EASY-HARD PROBLEM DISTINCTION

In this section, we will begin by recapping the definition of consciousness, moving on to reflect how the easy and hard problems can be understood in light of this definition.

D_f of Consciousness: Capacity to sense and respond to the environment, owing to the ability to distinguish oneself from it.

Carrying this definition, the easy problems can be understood as those which are involved in the sensing and responding to the environment. We sense a multitude of stimuli in the environment but respond coherently to a unitarily received landscape. A series of other features also populate our capacity to respond to the environment: complex systems can access their internal state and respond to the environment by providing a report on them, they can control their behaviour, they can focus their attention on a certain task.

Why are the easy problems easy? Chalmers mentions that the easy problems are easy precisely because they ask for functional explanations of abilities: that is, they seekmechanisms in which the function can be performed. How such explanations are provided within complex systems approach is outlined in the fourth part.

Following the above mentioned definition of consciousness, the hard problem of consciousness would be to explain *why* a system senses and responds to the environment in a certain way. The entire body receives the environment (a specific stimulant or a set of conditions) in a certain way, which cannot be duplicated or equalized to that which another body undergoes. This explicates what it is like to be a subject *x*- it manifests the perspective of the system.

Why is the hard problem of consciousness hard? While the easy problems need us to explain how a function is performed within a system, the hard problem asks for the structure which determines status of the system as a whole as it experiences the world, continuously. This asking is a seeking for the structure of experience itself, of *why* the system senses and responds to the world in a certain manner. This question arises because we observe that there are systems of different kinds of complexity and each receive the common world we inhabit in drastically diverse ways, evident through the varying responses. This act of receiving the world encompasses the qualitative character of an experience, named qualia.

PART 2: COMPLEX SYSTEMS APPROACH AND EMERGENCE

2.1. COMPLEX SYSTEMS

Complex system refers to a structured arrangement of components[32] which are non-linearly interacting[33] with one another and self-organizing themselves[34] to respond effectively to the internal and external changes in the environment. Borrowing from Mario Bunge (Bunge 2000), we adopt the following axioms in complex systems approach (CSA):

A. Everything, whether concrete or abstract, is a system or an actual or potential component of a system;
B. Systems have systemic (emergent) features that their components lack, whence
C. All problems should be approached in a systemic rather than in a sectoral fashion;
D. All ideas should be put together into systems (theories); and
E. The testing of anything, whether idea or artifact, assumes the validity of other items, which are taken as benchmarks, at least for the time being.

By following such an approach, it becomes possible to account for as many possible factors as involved in explaining and predicting behaviour of the system. This can be explained by comparing the approach with other attempts to explain interaction between brain and mind. Identity theory says that brain states are mental states, thus we can understand mental states through sources of information about the brain- primarily MRI. However, in such a move, we do not gather information about the subject in a holistic manner: from her behaviour, from the way in which she interacts with the world at large- which is where we find her mind extended- embedded in her body and extended in the world around her. Eliminative materialism also faces the same charge. While choosing the approach, the aim is to find a method which would allow us to collect as much information as possible and then, to organize it in such a manner that it would reflect the form of life that the system embodies. This is possible through the complex systems approach.

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[32] Structured arrangement indicates that the components are interacting with one another, without there being a central or mother component. There can be sub-systems which have varying functions, which can be ordered on the basis of their contribution towards stability of the system.

[33] Non-linearity refers the phenomenon where the effect is not proportional to the cause. There are largely two types of non-linear interaction: positive feedback mechanism and negative feedback mechanism. In the positive non-linear interaction, the effect is amplified in proportion to the cause, as in the case of an infection turning into an epidemic or an employee mistreatment turning into a labor strike. In case of negative feedback system, the effect is diminished in comparison to the cause. A constant series of positive and negative feedback mechanisms allow the system to restore its stability, in confrontation with disturbance.

[34] Self-organization refers to the process where global structure develops spontaneously from local interactions between components.

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2.2. EMERGENCE

Along with understanding an existent as a complex system, the notion of emergence allows us to grasp the idea that the whole is other than the sum of its parts. Kurt Koffka, a prominent Gestalt psychologist pointed out that it is more apt to talk of the whole as an *other* than as *greater* than the sum of its parts (Dewey 2017). Coming to the definition of emergence: Emergence is the process of development of novel properties/wholes from the self-organization of components in a system. Novel properties refers to those which are not shared by any of the constituents. Such properties allow the system, as a whole, to be marked as a member of higher order of being, with causal power to affect the lower-level components.

With emergence, it becomes possible to begin observing a system as a qualitatively distinct individual. This qualitatively distinct individual exhibits spatiotemporal integrity, verifiable through boundary conditions[35] and has causal power that is oriented towards stable equilibrium of the whole.

2.3. THE INTEGRATION OF CSA AND EMERGENCE

This section discusses how following the complex systems approach, in company with notion of emergence allows us to handle the hard problem of consciousness. A detailed note on treatment of consciousness within this approach is provided in the next section.

An integration of the complex systems approach and emergence allows us to understand every existent through the following two stages:

1. Consider the existent as an integral whole in itself (as a complex system with a novel property);
2. Consider the existent as a component of a larger system (allowing to take into account series of factors which can contribute towards its behaviour).

By positioning an existent as an integral whole, we can account for the irreducibility of its behaviour to the causal power of its components and by situating it as a component within a larger system, we can explore the factors which affect it, as a whole.

2.3.1. WHY TALK OF IRREDUCIBILITY?

The hard problem of consciousness is fundamentally an issue of asking if the systemic property of brain, consciousness can be reduced to the activities of its components, the interaction between the neurons. By understanding the irreducible nature of consciousness, we can identify that the question, *Where is qualia in the brain?* is mis*placed*. The locus of qualia is our entire body consistently interacting with its environment, the lived experience of this body.

2.3.2. IRREDUCIBILITY

To say that a system x is ontologically irreducible to its components C_1, C_2, C_3....C_n is to claim that the causal power of x (exhibited through its behaviour) is not derived from the causal power of its components alone. This happens because when we consider causal power of the components alone, we cease to look at the whole, the system. The epistemological counterpart to this is to say that a system x is epistemologically irreducible to its components C_1, C_2, C_3....C_n is to claim that the explanation and prediction of behaviour of x cannot be carried out through theories which apply to the lower-level components. The relation between these two senses of irreducibility (ontological and epistemological) can be stated in the following ways:

- A system which can be ontologically reduced to its components can be epistemologically reduced;
- When an epistemological reduction of ontologically reducible system is not possible, it is due to lack of information about the components (current knowledge); and
- When an attempt to epistemologically reduce a system which cannot be ontologically reduced to its components is made, then we encounter the ontic residue of novel quality belonging to the whole.

2.3.3. ONTIC RESIDUE OF NOVEL QUALITY

When we try to explain or predict behaviour of a system through its components, to which it cannot be ontologically reduced, we encounter ontic residue of novel quality. This occurs because, as mentioned earlier, in attempting to explain the whole through its components, we lose sight of that which marks the qualitative distinction of the whole as an individual, its novel property.

Let us take example of cells and atoms. As atoms self-organize, we witness the emergence of molecules. Uptil this point, we observe molecular properties: molecular size, molecular formula, melting and boiling point, solubility in water, electrical conductivity and others. After a certain point of complexity, we encounter the emergence of cells which possess the following novel properties among many others: capacity to reproduce, capacity to self-regulate, ability to acquire and utilize energy, capacity to sense and respond to stimuli. Ontologically, the cells have properties which are unpossessed by its components, atoms. Thus, they cannot be ontologically

[35] "... a system that is generated through a closed organisation of production processes such that the same organisation of processes is regenerated through the interaction of its own products (components), and a boundary emerges as a result of the same constitutive processes." (Boulding and Khalil 2002)

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reduced. When we attempt to epistemologically reduce them, then we encounter that we cannot explain property of self-regulation (which applies only to a cell, which has membrane that defines its spatiotemporal integrity). A further exploration of irreducibility can be made in more detailed terms through the idea of order and level.

2.3.4. ORDER AND LEVEL

An order refers to the kind of causal power an existent exercises to negotiate its survival in the environment. To find the causal power of a system, we have to find out the complex system within which it is a component (say, a human being x can be considered a component within the complex system of society or community), and lay down the properties it has through its behaviour, accompanied by self-reports and corroborated through physiological monitoring in sync with its internal structure. There are broadly three orders:

A. Material: Those systems which are oriented towards thermal equilibrium alone are considered members of material order. The novel quality of material order is being. To be, is to move towards thermal equilibrium.

The members of sentient and phenomenal order possess a sense of self. This sense of self is simply that recognition of oneself as distinct from the environment. This will include all living beings. In CSA, to be a mind is characteristic of sentient and phenomenal order. Thus, we witness mentality in the following two orders:

B. Sentient: Those systems which have the capacity to sense and respond to its environment, owing to the ability to distinguish itself from the environment are considered members of sentient order. The novel quality of sentient order is consciousness or self-awareness, minimally defined as, the capacity to distinguish oneself from the environment and to orient oneself towards stable equilibrium.

C. Phenomenal: Those systems which have the capacity to qualitatively distinguish itself from the environment, exhibited through the exercise of choice and responsibility. Here, the primal choice is that of choosing one's source of stable equilibrium, choice being the ability to exhibit preference for a certain form of living and the responsibility is to recognize and acknowledge one's contribution towards an occurrence. The novel quality of phenomenal order is self-consciousness. Thus, members of phenomenal order can choose the source of their stable equilibrium and also set up conditions to fulfill them.

No appeal to a non-physical[36] is made when we present such a hierarchy. The hierarchy is to exhibit that the higher the complexity, the greater the capacity of system to adapt to its environment by setting up conditions for fulfilment of its stable equilibrium (after a certain point, we encounter self-consciousness where the member can *choose* its source of stable equilibrium and also set up conditions to fulfill it).

PART 3: CONSCIOUSNESS IN COMPLEX SYSTEMS APPROACH

There are varying definitions of consciousness in philosophy of mind. To avoid vagueness in discourse, it is best to mention the definition followed in this paper. Consciousness refers to the capacity to sense and respond to the environment, owing to the ability of a system to distinguish itself from the environment. This is the first sign of a sense of self- that the system can identify its spatiotemporal integrity (through boundary conditions).

There are two senses in which we can approach consciousness: the how and the why. The CSA answers the *how* and the notion of emergence answers the *why* within the framework of embodied mind.

Coming to the *how:* In the brain, the neurons consistently interact with one another leading to the emergence of dynamic brain signatures. These dynamic brain signatures are our mental states which are embedded throughout the body. As the body receives the world, it is represented in the brain continually. A subject becomes conscious of x when the rate of formation of cell assemblies passes a certain threshold during the representation of x. This x can be an external object or an object within the representational model of the subject. By understanding the interaction between neurons forming networks, it is possible to understand how different cognitive functions are carried out, thus covering the easy problems of consciousness.

As the complexity of a system increases, its degree of consciousness also increases. Thus, according to the complex systems approach, from the member of sentient order with the lowest level of complexity, we witness consciousness (mentality/intentionality). It is after the passing of a threshold of complexity that a different kind of consciousness- self consciousness- arises in human beings, amongst other kind of beings.

My interest in this paper is to focus heavily on the *why* dimension, so I take leave of the *how* with reference to works of Klaus Mainzer[37], N.M. Krieger[38] and Andrei P. Kirilyuk[39].

[36] Physical refers to that which is exists in the spatiotemporal realm.
[37](Mainzer 2008, 2004)
[38](Krieger 2013)

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PART 4: QUALIA: AN INTEGRATIVE ENCOUNTER OF THE EXISTENT IN THE WORLD

Qualia is the qualitative character of experience- it encompasses everything that the body undergoes at the moment of experience (more aptly, moment-to-moment).According to complex systems approach, every subject has representation of the world. There are research studies on how the body is represented in various regions of the brain. In the same way, the environment is also rep resented continually, moment-to-moment, in the network of dynamic brain signatures. However, these representations in themselves are placed within the world-orientation of the subject. World-orientation is the way in which an individual looks at the world, to make sense and navigate it for its survival. Thus, it is the subject's model of reality. However, this model of reality is not *located* (as a physical object would be) in the brain or in specific region of the body. The model of reality that every subject possesses i s evident through intersubjectivity, by witnessing the interaction that the subject with its world. Consider a model of action that a foot ball team creates: where is this model of action? Though they could make a written blueprint of it, that is not *what* the model is. The model is observed in the game, in how the players are interacting with one another. In the same way, we can witness the world-orientation/perspective of a subject through the interaction she undertakes with the world. How is this world-orientation built? This model is built as the subject develops within the environment and becomes familiar with it.

The following three stages mention the process of how we receive and respond to the world. They are intertwined. The linearit y explicated here is only for the sake of convenience. Though each step occurs, it is already involved with the series of steps that have already taken place and are going to take place- like listening to a piece of music, the meaning of any sound in a song emerges through its relation to the sounds that have previously inhabited the song and those which succeed it.

Stage 1: We are continually in interaction with our environment, since the moment of our entrance into the world[40]. Our sense organs receive input of multitude of sensory information. This receiving is not accessible to cognition at the first stage. In this sense, it is unevaluated, bare receiving of information. This is akin to the concept of indeterminate perceptionin Indian phi losophy. This is also often posited as the impenetrability of cognition in philosophy of mind.

Stage 2: The received information is re-presentation from moment-to-moment (in form of dynamic brain signatures) within our world-orientation. As mentioned earlier, the world-orientation is perspective of the existent towards its world, observable in the intersubjectivity. Thus, any received information is never an alien object to us. It is swallowed within the framework we set up to make sense of the world. At this moment, the perception has become determinate. In terms of philosophy of mind, it is penetrated by the cognition.

Stage 3: The existent responds to any stimulus as an embodied mind, more aptly, the mindful body. The body and mind cannot be separated ontologically- that is, they are embedded onto each other. The mind grows on your body, as a grass which covers the fertile soil of a ranch. The body is thus full of mind. That which we receive is never alien- it is always received as a guest to a house is, we have already setup an environment within which it can be accommodated: this is the concept of intentionality[41] within philosophy of mind. The brain is continuously representing the body and its situatedness in the world within its world-orientation in form of dynamic brain signatures. These signatures are embedded throughout the body through regulatory powers of the brain. The mind is this process of an organism embodying an intentional stance towards an other[42]. This other can be it's own self or an other in the environment.

This process can be stated in the following three ways:

1. The body and mind share relationship of embodiment. The mind is a process embedded throughout the body. They are not ontologically separate.
2. The mindful body continually receives the world as a multitude of sensory information which is represented in the brain in form of dynamic brain signature. This representation is positioning of the stimulus within the subject's world-orientation. Thus, the mindful body is medium of receiving the world for the brain. The brain is component of this body which has regulatory task of representing the stimulus within the subject's world-orientation[43].
3. Response of the existent to the stimulus is manifested through the mindful body. The entire body manifests my intentional stance towards the other. Intentionality refers to the capacity of an existent to direct its behaviour towards an other.

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[39](Kirilyuk 30 Sep, 2003)

[40] When this entrance begins is a matter of contention. Is it when the embryo is formed/at a particular gestation stage or when the child enters the environment external to mother's body? According to many research studies, the embryo is also in constant interaction with its environment- primarily, the mother's body and secondarily, the world that surrounds the mother.

[41] "Every mental phenomenon is characterized by what the Scholastics of the Middle Ages called the intentional (or mental) inexistence of an object, and what we might call, though not wholly unambiguously, reference to a content, direction toward an object (which is not to be understood here as meaning a thing), or immanent objectivity. Every mental phenomenon includes something as object within itself…" (Brentano 1973)

[42] "Mental" is a label we use for characterising intentional stance. Like we use the term "bodily" (state) to talk about that which characterises the stance of our bodies in the world.

[43] It is important not to posit this regulatory role as "governing" or "mother" role. The brain is a component of the mindful body and has the task of representation, within the complex systems approach. It does not have the role of a controlling unit or a mother component within the system. Yes, the functions it carries out along with other components of the body are more important than the role of many other organs but the role does not eclipse the independent autonomy of the mindful body as a whole. The system as a whole has a global structure which is *other* (not *greater*) than the sum of functions of all its components.

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Qualia, the qualitative character of an experience, is the integrative encounter of the above three stages. This belongs to the mindful body as a whole and cannot be reduced to the workings within any of the components of the body (like the brain or others).

PART 5: PIECING IT TOGETHER

The hard problem of consciousness- how can we understand the subjective aspect of an experience in an existent?- is misplaced, when it attempts to look for explanations in the brain. Because qualia, the subjective aspect is an emergent/systemic property of the mindful body, as a whole. It is an integrative encounter of the everything that one undergoes at the moment of experience and thus, cannot be studied through account of one of the components of the body, the brain alone.

It is, in principle, not possible to embody the qualia of a subject x in another subject y because the meaning[44] of an experience is situated within the world-orientation of the subject x, which consists in the intersubjectivity that her mindful body has undergone in the past and the manner in which her mindful body manifests the future expectations in her responses to the world. Thus, to pick out a certain neural map which is considered the representational map of a certain event and place it in another person's brain would be to eliminate the value of that event. Because the value of an event for an existent is derived, not from that which a particular component undergoes, but in the experience of the event situated between the past and future of the existent and most importantly, in the world-orientation which is a systemic property of the whole ontologically extended in the intersubjectivity of an existent.

We can access qualia of the other, where access implies the ability to approach, is through sources of information that discuss the mindful body as a whole. These sources of information include those writings which talk about the experience of a mindful body as a whole- writings of existentialism, phenomenology, literature amongst others. Thus, science, defined as systematically decomposing the subject to its components to explain the properties of system, cannot give us access to the scientist. However, science understood as the inclination of choosing a method in sync with the nature of object of concern, can create a space where every existent can be understood as a complex system with independent autonomy and also as a component within a larger system and approach through the right sources of information.

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[44] Meaning being the value of a certain experience of a subject, within its world-orientation

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Talk 5: (Hall 1)

Understanding Modern Science Through Vedantic Philosophy

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ABSTRACT
Science rests upon a definition of what constitutes the right means of knowledge through which something can be known. Science, like the classical philosophies of India, recognizes the validity of sensory perception and reason as the main means at our ordinary disposal for gaining authentic knowledge about the world and about ourselves. Yet science is not content with what the senses present us as reality, any more than the mystic or yogi is, though science builds upon rather than rejects what the senses show. Science has created a vast array of special instruments and equipment from microscopes and telescopes that can greatly increase the range of our physical senses. It has added other instruments like radio telescopes which bring in information about the universe from means that are related to but outside the scope of our ordinary senses. It has created special computers to extend the range of computation as well. While Vedic science recognizes the importance of sensory perception and reason, it further considers that there is another, more reliable and internal source of knowledge, particularly necessary for understanding the inner or spiritual world. This is the direct perception of the silent or meditative mind.
Key Words: knowledge, science, perception, spiritual, senses

1. INTRODUCTION.

The central tenet of Vedanta (also known as Vedānta-sūtra) is that everything is dependent upon an original sentient/conscious foundation or self-knowing absolute truth. The first cliché of Vedānta-sūtra states that under the guidance of a spiritually realized being, we must inquire into our true nature as spirit (*athāto brahma jijñāsā*). The second saying of Vedānta-sūtra provides the initial indication of how to begin this inquiry (*janmādy asyayatah*). *Janma* means birth, *asya* refers to everything (entire cosmos which includes both matter and life) and *yatah* means 'from whom'. Therefore, to begin the inquiry into our true nature, we must first inquire into the original source of everything. Śrīmad-Bhāgavatam is considered as a natural supplementary commentary on the Vedānta-sūtra. The first verse of Śrīmad-Bhāgavatam elaborated the commentary of the second saying of Vedānta-sūtra (*janmādy yatoṅvayāditarataścārthesvabhijñahsvarāt*). "*Janmādy asyayatah*" – the origin of everything is "*abhijñahsvarāt*" – the unitary Supreme Cognizant Being. This Vedāntic explanation that unitary Supreme Cognizant Being is the source of everything is founded on the scientifically verifiable axiomatic facts: (1) Life comes from Life, and (2) Matter comes from Life. Consciousness arises from consciousness, or life comes from life. Where there is life there is consciousness. Consciousness does not originate from that which is unconscious or impersonal, and life is not a product of insentient matter. The conception that life comes from life (biogenesis) is the only scientific idea that has ever been verified by experiment and observation. The second axiomatic fact 'Matter comes from Life' is apparently observable in nature. Every species produces their own chemicals necessary within their bodies. 'Life comes from Life', and 'Matter comes from Life' are the scientifically observable deductions from Vedānta. On the other hand, materialism (life originates from matter) is an unverified ideological presupposition that has no scientific or observation-based evidence to support it. (*Bhakti Niskama Shanta, Life and consciousness – The Vedāntic view Communicative & Integrative Biology Vol. 8 , Issue. 5, 2015*)

There are two kinds of selves according to Vedanta. The Supreme Self as delineated in the above section and the dependent selves which are innumerable in number. The advaita Vedanta recognizes the individual self as an illusion created by' Maya. They give the example of reflection of the moon in the water to support that idea. However all the main Vaisnava Acharyas do not support the idea because Sankaracharya gave such an idea only to counteract Buddhism which does not believe in anything that has any intrinsically real and eternal value such as the soul.

2.IMPORTANT VEDIC SCIENCES

Vedic Science is to be understood, first of all, as a reliable method of gaining knowledge, as a science in the most complete sense of the term. It relies upon experience as the sole basis of knowledge, not experience gained through the senses only, but experience gained when the mind, becoming completely quiet, is identified with the unified field. This method, examined in relation to the modern sciences, proves to be an effective means of exploring the unified field of all laws of nature. On the basis of this method, complete knowledge of the unified field becomes possible. It is possible to know the unified field both subjectively on the level of direct experience through exploration of consciousness and objectively through

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the investigative methods of modern science. Vedic Science gives complete knowledge of consciousness, or the knower, complete knowledge of the object known, and complete knowledge of the process of knowing. In knowing the unified field, all three-knower, known, and process of knowing the united in a single unified state of knowledge in which the three are one and the same. Thus we can say that " In knowing the unified field, all three-knower, known and process of knowing are united in a single unified state of knowledge in which the three are identical and yet distinct" They form an identity –in-distinction. The idea of identity –in- distinction has been well developed by the Acharyas like Sri Ramanuja and others for this purpose. To make them identical in all respects is an extermization that does not come out through a rational and holistic approach in which the entire Vedanta Sutras are taken organically as a holistic system of knowledge.

Vedic Sciences include both subtle or occult sciences like astrology and the inner science of Self-knowledge through Yoga and Vedanta. Yet it sees all sciences as related. All knowledge is ultimately self-knowledge. Our true self is not merely the human or psychological self but the universal Self. Each one of us is a unique manifestation of the universal consciousness, a human embodiment of it, but our true being is one with the entire universe, with all beings, and ultimately with the Absolute beyond all time and space (Parabrahman). The key even to understanding medicine or physics is to look at the forces of the universe as existing both within and around us as powers of consciousness – to our true being in the universe and the entire universe within ourselves.

2. YOGIC SCIENCE

Yoga in the classical sense is the practical means of developing the meditative mind to allow for direct perception of truth. As such, it is the basis of all the inner or Vedic sciences. Vyasa, the main ancient commentator on Patanjalis Yoga Sutras, the most important classical text on Yoga, defines Yoga as samadhi or the mind free of conditioning and preconception, the mind in a state of deep meditation. The Yoga Sutras begin with Samadhi Pada or the section dealing with Samadhi. The third and fourth sections of the book also deal mainly with Samyama, which is the joint practice of Dharana, Dhyana and Samadhi.

In the third section of the Yoga Sutras, different forms of knowledge gained by Samadhi are outlined. These include meditations on objects from sites in one's own body to the forces of nature that reveal both the nature of the universe and can grant superhuman powers. The greatest knowledge that can be revealed by samadhi is that of the Purusha, which is not only our true Self but the Self of the universe and yet, in its own nature, is beyond all manifestation.

The field of Yogic science is vast. It includes practices like asana, pranayama, ritual, mantra and meditation. It can reveal knowledge not only of our ordinary body and mind, but of all aspects of the collective and cosmic minds, extending to the very processes of creation. Yoga contains special ways of knowledge relative to the body, mind, prana, senses and consciousness internally and to the powers of energy, light, matter and space externally.

3. AYURVEDA

Yet the deeper knowledge not only relates to spiritual practices, but also to bringing well-being to all aspects of our nature as well. In the Vedic sciences, human well-being is defined as the harmony of body, mind, *prana* and soul (Atman or Purusha). Ayurveda, Vedic medicine, shows us how to find health and well-being through understanding the forces of nature and consciousness both within and around us.

The main different between Ayurveda and what we could call scientific medicine is that it recognizes an underlying *prana* or vital energy behind all bodily activities. Modern medicine tries to explain all these processes, sometimes extending to human emotion and intelligence, according to biochemistry alone, as if there were no conscious entity or force of life behind the process. In this regard, modern medicine is often more reductionist and physically based than is modern physics!

The concept of *prana* posits an overall field of energy and intelligence as a totalistic and holistic power to explain the factors of life at both individual and cosmic levels. As science is now looking for an underlying consciousness behind the universe to explain the laws of physics, it must also look to an underlying cosmic life-force behind life to explain its development. An organic system must include some unique being above and beyond its particular components, processes or chemical reactions.

5. MODERN SCIENCE AND VEDIC SCIENCE

Within the last few years, modern theoretical physics has identified and mathematically described a unified field at the basis of all observable states of physical nature. Einstein's hope of finding a unified field theory to unite the electromagnetic, gravitational, and other known force fields has now been virtually realized in the form of unified quantum field theories. Instead of having several irreducible and distinct force fields, physics hopes that it can mathematically derive all four known force fields from a single super symmetric field located at the Planck scale (10(-33 cm) or 10-(43 sec.), the most fundamental time-distance scale in nature. This field constitutes an unbounded continuum of non-changing unity pervading the entire universe. All matter and energy in the universe are now understood to be just excitations of this one, all-pervading field.

The basic research of modern science and Vedic Science has three major goals:

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- to develop an integrated structure of knowledge by fathoming the depth of correspondence between the principles of modern science and Vedic Science
- to provide, from Vedic Science, a foundation in direct experience for the most profound theoretical concepts of modern science
- to resolve the impasse faced by the objective approach of modern science through the addition of the subjective approach of Vedic Science, which provides complete knowledge of nature on the basis of the complete development of the knower.

Physics now has the capacity to accurately describe the sequence by which the unified field of natural law systematically gives rise, through its own self-interacting dynamics, to the diverse force and matter fields that constitute the universe. With a precision almost undreamed of a few years ago, the modern science of cosmology can now account for the exact sequence of dynamical symmetry breaking by which the unified field, the singularity at the moment of cosmogenesis, sequentially gave rise to the diverse force fields and matter fields. It is now possible to determine the time and sequence in which each force and matter field decoupled from the unified field, often to within a precision of minute fractions of a second. This gives us a clear understanding of how all aspects of the physical universe emerge from the unified field of natural law. On the other hand theories attempt to develop the idea of quantum gravity. However, it has not been realized really. So the idea of grand unification is a distant dream. Moreover through quantities like electronic charge, mass of fundamental particles, Plank's constant and velocity of light explaining life is a challenging to the scientists.

Mathematics, physiology, and other sciences have also located a unified source and basis of all the laws of nature in their respective disciplines. In mathematics, the foundational area of set theory provides an account of the sequential emergence of all of mathematics out of the single concept of a set and the relationship of set membership. The iterative mechanics of set formation at the foundation of set theory directly present the mechanics of an underlying unified field of intelligence that is self-sufficient, self-referral, and infinitely dynamic in its nature. Investigations into the foundations of set theory are ultimately investigations of this unified field of intelligence from which all diversity of the discipline emerges in a rigorous and sequential fashion. In physiology, it is the DNA molecule that contains, either explicitly or implicitly, the information specifying all structures and functions of the individual physiology. In this sense, therefore, it is DNA that unifies the discipline by serving as a unified source to which the diversity of physiological functioning can be traced. However this is also an old knowledge that has been proved only to be partially true. We can see the work of Barbara McClintock and James A Shapiro to understand that information of physiology cannot be compartmentalized in this way by any Cartesian dualistic fashion. It only indicates that the information of life processes (physiology) is holistic and not reductionistic as assumed in conventional biology and as realized as only a partial explanation in frontier biology after the work of Barbara McClintock for which she received the Nobel Prize.

Each of the modern sciences may indeed be said to have glimpsed a unified state of complete knowledge in which all laws of nature are contained in seed form. Each has gained some knowledge of how the unified field of natural law sequentially unfolds into the diverse expressions of natural law constituting its field of study. Modern science is now discovering and exploring the fundamental unity of all laws of nature.

The name "Vedic Science" thus indicates both the ancient traditional origins of this body of knowledge and the modern commitment to experience, system, testability, and the demand that knowledge should be useful in improving the quality of human life.

6. CONCLUSION

The founders of the ancient Vedic tradition discovered the capability of the human mind to settle into a state of deep silence while remaining awake, and therein to experience a completely unified, simple, and unbounded state of awareness, called pure consciousness, which is quite distinct from our ordinary waking, sleeping, or dreaming states of consciousness. In that deep silence, they discovered the capability of the mind to become identified with a boundless, all-pervading, unified field that is experienced as an eternal continuum underlying all existence. They gave expression to the self-sufficient, infinitely dynamic, self-interacting qualities of this unified state of awareness; and they articulated the dynamics by which it sequentially gives rise, through its own self-interacting dynamics, to the field of space-time geometry, and subsequently to all the distinct forms and phenomena that constitute the universe. They perceived the fine fabric of activity, through which this unity of pure consciousness, in the process of knowing itself, gives rise sequentially to the diversity of natural law and ultimately to the whole of nature.

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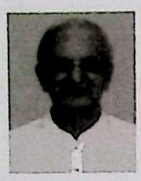
Plant Sentience in Relation to Spiritually Positive Stimuli



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Abstract

Spiritual Research Centre and Ashram in Goa, India has been known to have high levels of spiritual positivity due to the presence of Saints and seekers of Spirituality residing on its premises.The spontaneous growth of over 200 Audumbar (Holy fig) trees on the premises of the Spiritual Research Centre and Ashram prompted the spiritual research team to compare them with other Audumbar trees in the same vicinity. Using an aura and energy scanning device, it was found that the positive aura of Audumbar trees in the Ashram premises was far greater than those outside its premises even though the soil and physical conditions they were exposed to were similar. The experimentindicatedthat the Audumbar treeis able to sense and respond to the heightened positive spiritual vibrations present in theAshram. This is also reflected by the relatively high density of the Audumbar saplings or trees within the ashram premises as compared to outside the Ashram. Similar experiments conducted on a Tulsi plant showed that its subtle energy and aura increased positively in response to various spiritually positive stimuli that included the Ashram environment, spiritual rituals and being tended to by a Saint. Due to the various positive stimuli, over a period of 37 days, the Tulsi plant's aura recorded an increase in distance of 170% from the time it was first brought into the Spiritual Research Centre and Ashram.These experiments among many others demonstrate the innate cognitive ability and sentience in plants to respond to spiritually positive vibrations.

Keywords : Audumbar, Tulsi, Aura of plants, Spiritually positive vibrations, Sentience in plants

Introduction

The Spiritual Research Centre and Ashramis located inforested land in the heart of Goa, India. Nestled between two renowned temples in Goa, the Spiritual Research Centre and Ashram is home to approximately 500 seekers who are practising Spirituality.Along with practising Spirituality, seekers live a spiritually purer (*sāttvik*) way of life, for example, no non-vegetarian food is cooked or consumed in the Ashram premises. At any given time,approximately 10 to 15 Saints reside at the Spiritual Research Centre andAshram. Over the years, many Saints and researchers have visited the premises of the Spiritual Research Centre andAshram and have remarked on the high level of spiritually positive vibrations they have felt. One Saint who was of a higherspirituallevel called the Ashram 'a temple', thus comparing it to a place of worship.

At the Spiritual Research Centre and Ashram, many experiments have been conducted to understand how the spirituallypositive vibrations of the premises affect people, animals, plants and even non-living things in a positive manner. In this document, the aspect of cognition and sentience in plants is discussed in relation to how they respondto spiritually positive vibrations in the environment.

Audumbar treesand the Spiritual Research Centre and Ashram

Even though there has been no active planting of saplings of the Audumbar tree (Udumbara or the Holy-Fig tree) on the premises of the Spiritual Research Centre and Ashram, there are over 200 such plants on the premises.

The Audumbar Plant Phenomenon

On 17-Sep-2015, as per the guidance of a Saint of a higher level, seekers in the Spiritual Research Centre and Ashram began to recite the *Dattamala mantra*. The purpose of thisrecitation was to invoke the blessings and spiritual protection of Deity Dattatreya. One of the functions of Deity Dattatreya is to provide protection from problems due to departed ancestral spirits. Over 20 seekers at a time would recite the *Dattamala mantra* in Sanskrit in the temple room of the Ashram-24 times during each 1.5-hour session. In the initial months, there were 3 such sessions conducted daily - in the morning, afternoon and evening. In recent months, as of Sep 2016, only 1 session is being conducted daily.

Within a couple of months after the chanting began (on 17-Sep-2015), in Nov 2015, it was observed that some plants began to sprout all along the perimeter of the Ashram courtyard. Maximum number of plants were seen just near the temple room where the chanting sessions were going on.

Please note these saplings were not planted by any person, and to the best of the knowledge of the research team, they had grown spontaneously.

Dr Ajay Joshi a resident veterinarian (who is also a seeker) identified the saplings as FicusRacemosa locally known as Audumbar (Udumbara) or the Holy-Fig tree. According to Hindu culture and as mentioned in the Holy text Shree Gurucharitra, this tree is considered Holy and is closely related to Deity Dattatreya (Gangadhar Sakhare, 15th Century). Thus, it is common to see the Audumbar tree near DeityDattatreya'stemples. The plant is also known to have many natural healing properties (Hebbar, 2016).

The fig is actually a cluster of flowers, covered by globular skin. The flowers of the Audumbar tree are pollinated by certain wasps, which enter the fig fruit to lay eggs. Apart from stem cuttings, their main way of propagation is

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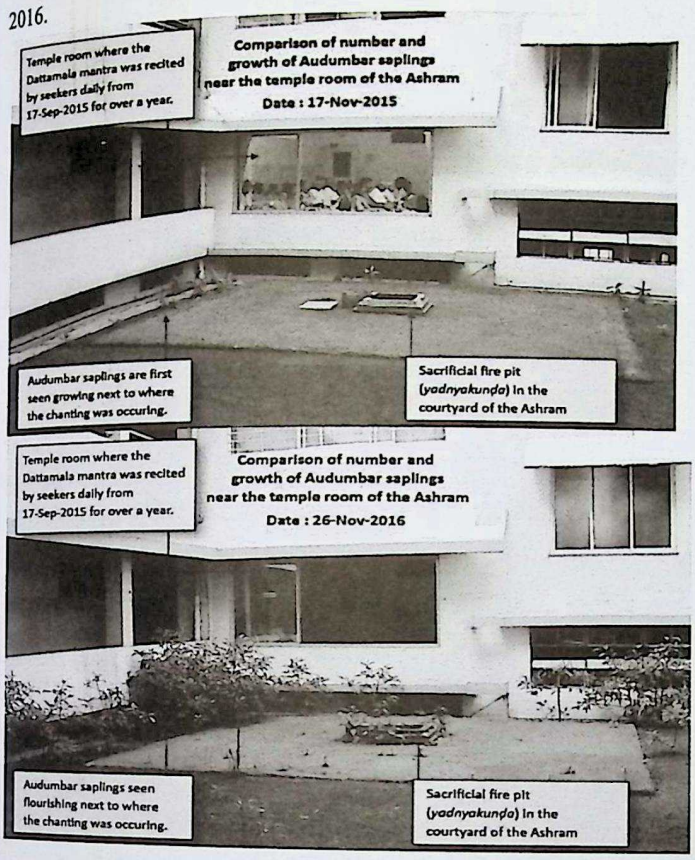
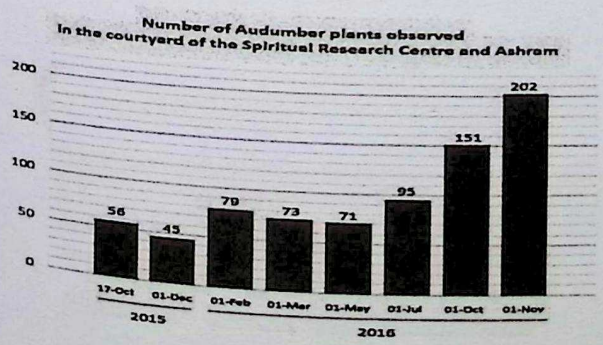
when birds eat the fruit of the Audumbar and the seeds are then dispersed through birds' droppings (Kalbag, 2016).

This is a picture of the courtyard just outside the Ashram temple room. The following two pictures show the difference between the number of saplings observed and how they have grown from the early stages in Nov 2015 to Nov 2016.



At first, it was observed that the plants grew only along the perimeter of the internal courtyard of the Ashram. Maximum concentration of the plants was just outside the temple roomwall at the corner of the courtyard where the recitation of the *mantra* was taking place. Withtime, more Audumbar plants were seen sprouting on the northern and eastern areas too. Yet for many months, very few Audumbar plants were noticed on the southern side of the courtyard. Then in September 2016, we saw a sudden spurt of Audumbarsaplings growing on the southern side. In the chart below, we have documented this unusually high growth rate of the Audumbar plants as they sprouted all over the courtyard in 2015-2016.



It is important to stress that no attempt was made by the Ashram seekers to plantany of the Audumbar saplings seen in the photos above. To the best of the knowledge of the spiritual research team, the saplings sprouted on their own. This is even though the soil in the courtyard is not considered to be fertile. Also, no extra soil was laid out during this period.

- Historically since the establishment of the Ashram building in 2005, no plants have been seen growing in the quadrangle. The whole quadrangle is cordoned off by 4 floors and has a deep foundation. Birds are rarely seen in the enclosed courtyard and it is not easily accessible to them.
- It is highly unlikely that birds decided to lay their droppings neatly along the perimeter of the Ashram courtyard concentrating just near the temple room. Also, there areeaves over each floor. If the birds' dropping theory had any weight, then at least some droppings would have been seen on the eaves. However, no birds' droppings have been seen anywhere on the eaves.
- The appearance and flourishing of these Audumbar plants have coincided with the chanting of the *Dattamala mantra*. It can be stated that the recitation of the *Dattamala mantra* is perhaps the only known changebefore and after the observation of this unique phenomenon.
- The interesting and intriguing fact is that only Audumbar saplings have been seen to be growing in the Ashram courtyard during this period and no other type of plants. Also,apart from the Ashram courtyard,no new Audumbar saplings were seen growing elsewhere on the Ashram premises.Given that there has been no active plantingof these Audumbar saplings, it is quite remarkable how they have flourished.

While the spontaneous growth of 202 Audumbarplants in the Ashram courtyard defies rationale thought, there is a strong co-relation in timing between the chanting of *mantras* related to Deity Dattatreyaand the growth of these plants. Is it possible that *mantras* in Sanskrit can bring aboutthe growth of plants? Further research into this event can shed light on the intricacies of how plants respond to the spiritual energy generated by *mantras*.

The effect of the Ashram premises on Audumbar trees

Apart from the 202 Audumbar saplings growing in the Ashram courtyard, there are quite a few Audumbar trees growing on the Ashram premises. None of the saplings/trees have been planted. They have all grown spontaneously. From a spiritual perspective, the environment was highly conducive for the growth of the Audumbar plants in the ashram courtyard. As per the understanding of the spiritual research team at the Ashram this is due to the following reasons.

The chanting of the *Dattamala mantra* in Sanskrit was guided by a Saint of the highest order and had His blessings. This heightened the power of the *Dattamala mantra*.

1. The devotion of seekers act as a magnet in invoking the blessings of the Deity associated with the *mantra*.
2. There is a spiritual rule that states, 'The word, touch, form, taste, smell and its related energy coexist'. The inbuilt spiritual power of the*Dattamala mantra* in Sanskrit generated vibrations of the Dattatreya Principle. These vibrations are most conducive for the propagation and growth of the Audumbar tree as its vibrations closely match the Dattatreya Principle.

While the above points explain the conducive nature of the environment for the growth of Audumbar trees, it is unclear as to what was the catalyst for

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growth. Was it just nature or Divine intervention ?More research into this aspect of the phenomenon is required. However, the extraordinary and spontaneous growth of Audumbartrees in the Ashram premises (both inside the courtyard and outside)prompted the question whether they had any speciality when compared with other Audumbar trees in the vicinity.

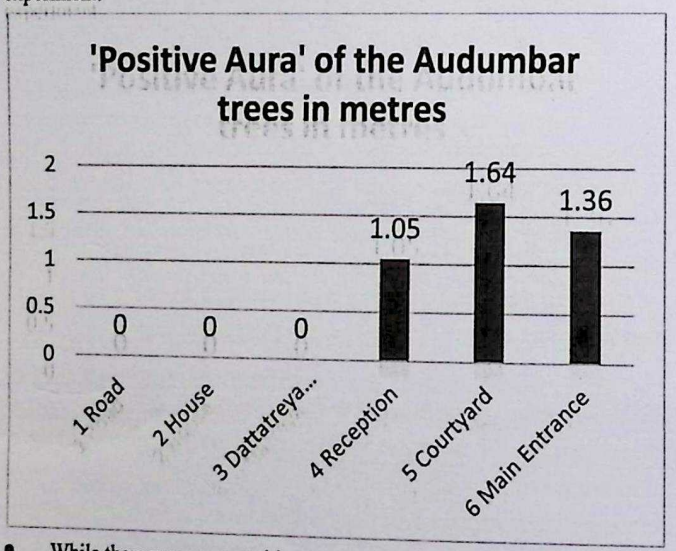
For this experiment, a Universal Thermo Scanner (UTS) was used. It is an aura and energy scanning device developed by Dr Mannem Murthy, a former nuclear scientist. The instrument measures the subtle energy (positive and negative) and the aura around any object (living or non-living) (Murthy, 2017).

A sample of six trees were chosen to be a part of the experiment; 3 outside the Ashram premises and 3 inside the Ashram premises. The locations of the treeshave been marked in the aerial picture below where serial numbers 1 to 3 represent the placement of the trees outside the Ashram. Serial numbers 4 to 6 represent trees within the Ashram premises. All Audumbar trees chosen for the experiment were located in a similar forested environmentwithin 700 metres from each other.

Key observations :

Positive energy

The following chart shows the distance **in metres** of the various 'positive auras' recorded by the UTS from the 6 Audumbar trees measured in the experiment.



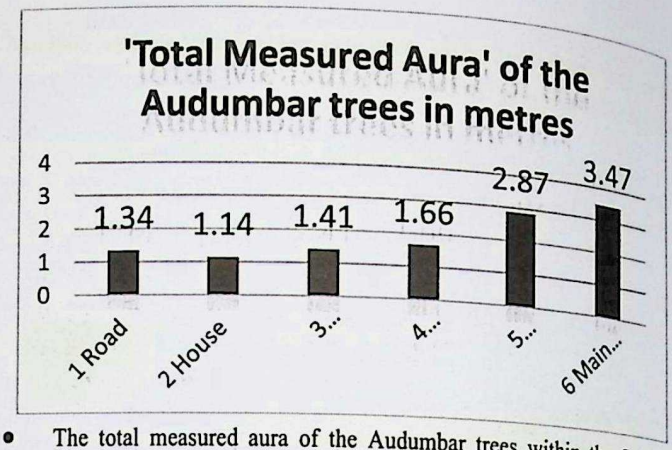
- While there was some positive energy recorded from the tree at the Dattatreya temple (3),it was not enough to measure its aura.
- All trees in the Ashram premises (4,5 & 6) showed a positive aura. The tree in the courtyard (5), which was one of the 202 Audumbar trees that grew spontaneously during the chanting of the *mantras*, recorded the maximum positive aura.

Negative energy

- The Audumbar trees on the road (1) and the village house (2) showed signs of some negative subtle energy.

Total measured aura

The following chart shows the distance **in metres** of the various 'total measured auras' recorded from the 6 Audumbar trees.



- The total measured aura of the Audumbar trees within the Spiritual Research Centre and Ashram premises were all greater than the trees outside the Ashram premises.
- Among the trees outside, the tree at the side of the Dattatreyatemple (3) recorded the higher total measured aura.
- In the Ashram,it was the tree at the entrance facing the room of His Holiness Dr Athavale that recorded the highest total measured aura of 3.47 metres.

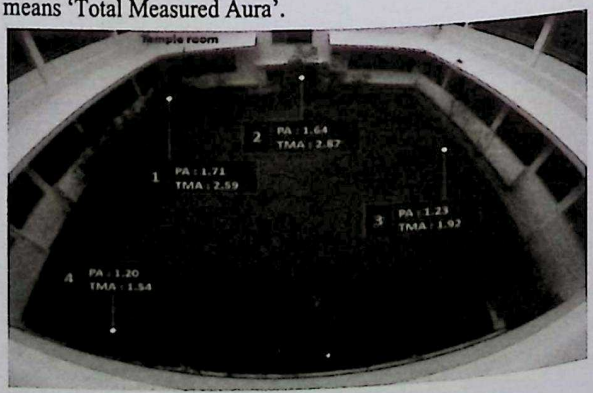
Conclusions and analysis :

- This experiment shows that the Audumbar tree responds to a spiritually positive environment.Among the trees outside the Ashram premises, the Audumbar tree at Deity Dattatreya temple had the highest levels of spiritual purity and the total measured aura.
- The size of the tree at the Dattatreya temple is over eight metres. Compared with this, the sapling in the Ashram courtyard is only 2 metres tall, yet the aura that it emitted was double that of the significantly larger tree at the Dattatreya temple. This shows that the size of the tree is not necessarily related to the positivity it can absorb and emit.Accordingly, it shows that plant sentience in relation to harnessing the benefit of a spiritually positive environment does not necessarily depend on the size or age of the tree. For the same species of plants, the strength of positivity/negativity that they are exposed to is arguably the main criteria to determine the type of aura (positive/negative) that they will have.

The effect of distance from the positive stimulus on Audumbar plants in the Ashram courtyard

Using the UTS,readings of a sample of 4 Audumbar plants (in the Ashram courtyard) at various distances from the temple room were taken. In the picture below, the readings of the plants have been mapped in relation to their position from the temple room.

Please notein the picture below: PA means 'Positive Aura' and TMA means 'Total Measured Aura'.



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Observations :

- None of the saplings in the sample measured had any negative vibrations.
- The readings showed that the saplingscloser to the temple roomhad higher levels of positivity and larger auras.
- As their distance from the temple roomincreased,their positivity reduced.

Conclusions and analysis :

- The spiritual positivity of the temple roomalong with the *mantras* that were recited were imbibed by the Audumbar plants.
- It shows the cognitive ability and sentience of plants such as the Audumbar to respond positively to the spiritually positive stimulus of the temple room and chanting of some *mantras*.

Effect of a Saint on a Tulsi plant

Background of the experiment :

In this experiment, it was planned to study the effect of a Saint of a higher level on a Tulsi plant (Holy Basil). The Tulsi plant is considered to be a Holy plant with high levels of spiritual purity (*sāttviktā*) (Simoons, 1998). For this experiment, two Tulsi plants in a single pot were used.

Methodology :

1. A baseline reading of the plants was taken using the UTS as soon as theywere brought tothe Spiritual Research Centre and Ashram for the ritual.

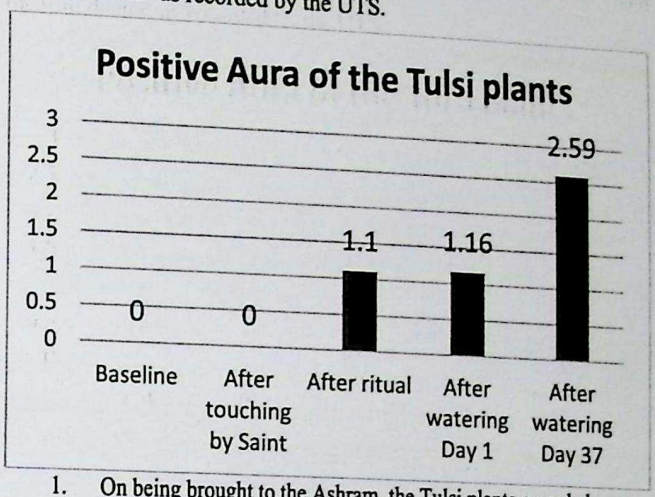
2. Thereafter, a ritual was conducted on the plants where His Holiness Dr Athavale (the Author) was required to touch the plants. A reading of the Tulsi plantswas taken immediately after the plants had been touched by Him.

3. Thereafter the plants were potted (in the same pot) in a ritualistic manner, and another reading was taken at the end of this process. As per the requirement of the ritual, the plants were kept at a secure place for eight days within the Ashram premises.

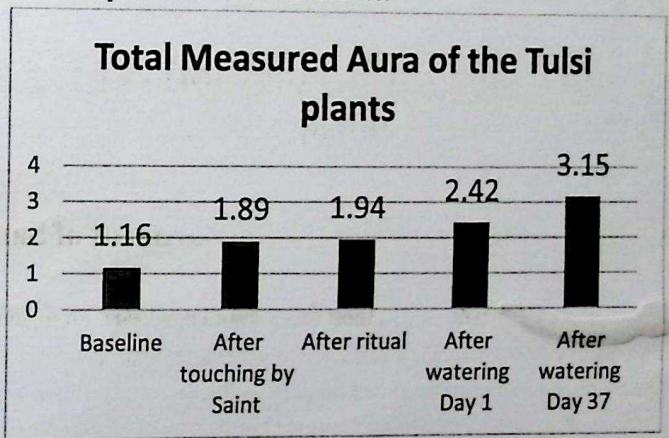
4. On the 9th day, the plants were transported to the balcony of the room of His Holiness Dr Athavale. The plant was kept there for 37 days. The readings were taken on 1st day after His Holiness Dr Athavale had watered the plants. At the end of the 37th day after being watered daily by His Holiness Dr Athavale, another reading was taken to study the effect of His interaction with the Tulsi plant.

Observations :

In the two charts below the readings of each step of the experiment has been provided in relation to the 'positive aura' and 'total measured aura' as recorded by the UTS.



1. On being brought to the Ashram, the Tulsi plants recorded some positivity but it wasn't enough to measure any aura.
2. However, after the ritual, which was approximately 6 hours after the Tulsi plants had been brought to the Ashram, they registered a positive aura of 1.1 metres.
3. Thereafter, over 8 days there was not much change in the aura while the plants were kept in the Ashram premises.
4. After being taken to the balcony of His Holiness Dr Athavale's room, where the plantswere watered by Him daily, the plants' positive aura more than doubled.



1. The total measured aura steadily grew with each step of the experiment.
2. After being touched by His Holiness Dr Athavale just after they were brought to the Ashram, the total measured aura mushroomed out by over 60% from 1.16 to 1.89 metres.
3. With regards to the total measured aura reading of 2.42 metres,it is unclear whether the jump from 1.94 metres was because the plants had been kept in the Ashram premises for 8 days after the ritual or because it had been watered by His Holiness Dr Athavale (just once). It is pertinent to note that the first time His Holiness Dr Athavale interreacted with the plant by touching it, it responded positively with a 60% rise in total measured aura. This may indicate that just one instance of the watering of the plants by His Holiness Dr Athavale had a greater effect on the plants as opposed to just being in the Ashram environment for 8 days.

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4. At the end of the experiment, over 37 days at the Ashram and having been watered by His Holiness Dr Athavale, the total measured aura of the plants increased by an extraordinary 170%.

Analysis and conclusion :

1. The Tulsi plant (like the Audumbar tree) showed a high ability to absorb positive vibrations from the environment.
2. Saints at a higher spiritual level emit high amounts of positive spiritual energy into the environment. The Tulsi plants when exposed to interactions by His Holiness Dr Athavale, showed an extraordinary ability to absorb the higher levels of positive vibrations.

Conclusions

The findings from various experiments elaborated in this paper showed that there is cognition and sentience in plants when exposed to a spiritually positive environment. As per Indian culture, Audumbar as well as Tulsi are considered spiritually pure plants and hence,it is likely that their propensity to absorb positive spiritual vibrations and emit them into the environment is substantially more than the other plants.

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Talk 6: (Hall 1)

Plant science in Atharvaveda: A study

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Veda is the ancient source of almost all kinds of knowledge. From animal to plants, everything is mentioned in the Veda. In present time science has developed a lot. Science divides into various different branches and Botany is one of them, where classification and description of various plants are present. A rational method of classification of plants was also used by the ancient Indians as the time times of the Atharvaveda though they might not have any idea of a natural classification of plants as known to the modern botanists.

Shri A. K. Ghosh and Shri S. N. Sen- *"Botany is a systemized branch of knowledge had not yet developed, and its evolution as a subject of specialized interest did not take place until after a much later date, nevertheless, by arranging and regrouping these scattered materials under meaningful heads in which is customary to describe the plant science , it is possible to get a fair idea of the morphology and internal structure of plants, their physiology, sentience and also weather at such distant date any attempt was made to their classification."*[45]

The Atharvaveda describes a number of plants among which a family relationship like that of grandfather, father, mother, brother and sister has been attributed.

"Asthuvṛkṣā ūrdhvasvapnāstiṣthād rogo ayaṁ tava |"[46]

The above mantra says that trees sleep while standing upright, but they do not sleep while they are awake that is they consist the quality of consciousness. This consciousness created both, the feeling of joy and fear. About a century ago scholar Jagdish Chandra Bose proved the existence of life in trees. But the scholar of Vedic age proved this without the help of labs, thousands of years ago.

"Bhadrātpalakṣānnistiṣthasyaśvatthātkhadirāddhavāt |
Bhadrānnyagrodhātpaṇātsā na ehyarundhati ||"[47]

[45] A concise History of Science in india, page-376
[46] Atharvaveda - 6.44.1
[47] Atharvaveda - - 5.5.5

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The given mantra mentions foliage named **lākṣā**, which is found in trees like bhadra, pākada, pīpal, khaira, dhava, vada, palāśa. In this vernacular trees like **latā** and **gulma** are also mentioned.

Root, shoot, stem, branches, leaves, flowers and fruits are described in Atharvaveda-

"auṣadhibhyaḥ svāhā mūlebhyaḥ svāhā tūlebhyaḥ svāhā
valśebhyaḥ svāhā puṣpebhyaḥ svāhā phalebhyaḥ svāhā |
vaspatibhyaḥ svāhā mūlebhyaḥ svāhā tūlebhyaḥ svāhā skandhebhyaḥ svāhā|
śākhebhyaḥ svāhā parṇebhyaḥ svāhā puṣpebhyaḥ svāhā ||"[48]
"prastṛṇatī stambinīrekśuṅgāḥ pratanvatīroṣadhīrā vadāmi |
aṁśumatīḥ kāṇḍinīryā viśākha hvayāmi te vīrudho vaiśvavīrugrāḥ puruṣīvanīḥ ||"[49]

prastṛṇatī (प्रस्तृणती) &spreading variety
stambinī (स्तम्बिनी)- bushy
kāṇḍinī (काण्डिनी) – jointed
aṁśumatīḥ (अंशुमतीः -rich in shoots
ekśuṅgāḥ ;एकशुङ्गाः single calyxed
viśākha (विशाख)-with spreading branches

"yā babhravo yāśca śukrā rohiṇīruta pṛśnayaḥ |
asiknīḥ kṛṣṇā oṣadhīḥ sarvā acchāvadāmapi ||"[50]

some plants are divided according to colour- babhru- brown, śukrā- white, rohiṇī- red, kṛṣṇā- black, asiknī - swarthy:

"suparṇo jātaḥ prathamastasya tvaṁ pittamāsitha |
tadāsurī yudhā jitā rūpaṁ cakre vanaspatīn ||"[51]

In suparno phase of sun, the sunrays have the power of increasing bile in human body. It is stored in herbs due to sunlight. Herbs growing in the wilderness can be made to have better medicinal attributes by using suitable methods. The above mantra on closer inspection reveals that Vedic sages reflected upon photosynthesis. That is scholars think that sunrays increase chlorophyll. Chlorophyll is very essential for the life of plants. Perhaps this chlorophyll is also known as bile. Thus, the Atharvaveda is very articulate about botany, and the fact that this kind of work could be done thousands of years ago makes it an astownding feat.

The third mantra of the above sukta is of foremost importance-

"sarūpā nāma te mātā sarūpo nām te pita |
sarūpakṛttvaṃoṣadhe sā sarūpamidaṁ kṛdhi ||"[52]

The plants which on combination make up this medicinal herb are originally used for cleansing the skin cells. Since, the parent plants have these characteristics; it is quite natural for the product to have the same properties. Thus, this herb is used for clarifying the colour of the skin. In the above mantra, we read about the attributes that the offspring obtain from the parents plants. This application is used as a gardening as of today.

"vihalho nām te pitā madāvatī nāma te mātā |
Sa hina tvamasi yastavamātānamāvayaḥ ||"[53]

The above mantra talks about plant whose parents are **bihallo and madabati**. This plant can be used for the protection of one's soul. Here we are talking about grafting methods used to create a better hybrid- one that combines the best characteristics from each of the **parcut** species to make a single plant with the best attributes.

"trāyantāmimaṁ puruṣaṁ yakṣmād deveṣitādadhi |
yāsāṁ dauṣpitā pṛthivī mātā samudro mūlaṁ vīrudhāṁ babhūva ||"[54]

Therefore, this protects men from the wrath of gods. This plant is born of the harmony between the cosmos, the earth and the ocean.

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2 Ibid - 10.7.38
[49] Ibid - 8.7.4
[50] Atharvaveda - - 8.7.1
51 Ibid -1.24.1
52 Ibid -1 .24.3
53 Ibid - 6.16.2
54 Atharvaveda - 8.7.2

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The above mantra paraphrases into something like this. Medicinal plants are born from the earth, but are protected by the rays of the sun. These plants save us from the wrath of nature and god, protecting us from illness. On scrutinizing the above lines, we can inter that the sun is the one of the demigods of the cosmos and thus helps plants in performing photosynthesis. Therefore we can conclude by saying that the Vedic scholars had an in depth knowledge about Plant science.

Parasite plants-

"Bhadrātplakṣānnistiṣṭhasyaśvatthātkhadirāddhavāt |
Bhadrānnyagrodhātparṇātsā na ehyarundhati ||"[55]

There is a parasitic plant named **lākṣā** which thrives on plants like Bhadra, pāka□, pīpal, dhava, bata, palāś. This plant is used for curing wounds.

Therefore, lives as a parasite just like the pīpal tree, stunting the growth of the carrier plant.

"Yathāśvatha vānaspatyānārohankṛṇuṣeadharān |
Evā me śatromūrdhānaṁ viṣvgbhindhi sahasva ca ||"[56]

Thus, the above mantra tells us about how veer supresses the growth of Śatru through an anecdote. Also it has been mentioned that the pīpal tree grows as a parasite on the other plants and stops their proper growth. Some more citations about parasitic plants are mentioned.

Applied Botany-

"Āsurī cakre prathamedaṁ kilāsbheṣajamidaṁ kilasnaśanaṁ |
anīnaśatkilāsaṁ sarūpāmakattvacaṁ ||"[57]

The herb named āsuri is supposed to be the best cure for leprosy. Not only does this help in keeping leprosy away, but also helps to achieve a uniform colouration of the skin.

Śyāmā sarūpaṁkaraṇī pṛthivyā adhyudbhṛtā |
Idamūṣu pra sādhaya punā rūpāṇi kalpaya ||"[58]

The herb named **śyāmā** helps in improving the health of our skin of also life complexion. This herb can be used by uprooting it from the ground.

"Yastvā pibati jīvati trāyase puruṣaṁ tvam |
Bhartrī hi śaśvatāmasi janānāṁ ca nyaṅcanī ||"[59]

Whosever drinks the nectar of **lākṣā** will receive nutrients, vitamins and energy.

"puṣpavatīḥ prasūmatīḥ phalinīraphalā ut |
saṁmātara iva duhvāmasmāknī ariṣṭatātaye ||"[60]
"aśvattho darbho vīrudhāṁ somo rājāmṛtaṁ habiḥ |
vrīhiryavaśca bheṣajau divasputrāvamartyau ||"[61]

pīpal, darbha, soma, food, water, rice and jau are **divya auṣadhī**. In this mantra pīpal and paddy are mentioned.

Dr. W. D. Brown is said- "*Vedic religion is thoroughly scientific where science and religion meet hand. Here theology based on science and philosophy.*"

Name of some medicinal plants in Atharvaveda-

1 bhagavatī and tārakā -"*udgātāṁ bhsgsvatī vicṛtau nāma tārakeḥ |*"[62]

2 daśavṛkṣa - "*daśavṛkṣa muṁcemaṁ rakṣso grāhyā adhi yainaṁ jagrāha parvasu |*"[63]

3 pṛśniparṇī[64]

4 dhānya- "*asmai supipplāḥ oṣadhīḥ kartaṁ |*"[65]

5 rohiṇī[66]

6 nitatnī[67]

7 guggalu[68]

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[55] Ibid 5.5.5
[56] Ibid - 3.6.6
[57] Ibid - 1.24.2
[58] Atharvaveda- 1.24.4
[59] Ibid - 5.5.2
[60] Ibid - 8.7.27
[61] Ibid - 8.7.20
[62] Ibid -2.8.1
[63] Ibid -2.9.1
[64] Ibid - 2.25.1
[65] Ibid - 3.17.5
[66] Ibid - 4.12
[67] Ibid – 6.136.1

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Several hymns in the Atharvaveda are praises of medicinal herbs and plants, suggesting that concepts about the medical and health value of plants and herbs was an emerging field of knowledge in ancient India. Plant science in Atharvaveda is important when global warming comes in mind. Global warming destroys the world. For this there is a slogan "save tree, save human".

इसमें सभी प्रकार रोग का नाम तथा उसके प्रतिकार में किस किस वनस्पति का प्रयोग हुआ है उसका वर्णन करना है। वर्तमान समय में दवाइया अर्थात् गोलि का इस्तेमाल भी वनस्पति को मेडिसिन मिलाकर उसके हर्ड फर्म में इस्तेमाल किया जाता है। उसी पर एक अवलोकन।

यहां पर malady वाला युक्त होगा। 2/27–पाटा औषधी। 2/7, यहां पर दिमागी अर्थात् सिर से सम्बन्धित व्यधियों के निरसन का वर्णन होगा, पृष्ठ–47

3/23/4–ऋषभक नामक दिव्य औषधि से गर्भदोष नाष। 4/1/4,

3/31,

4/9, 4/10, 4/12 4/13, 4/17,

4/18/7-*अपामार्गोऽपि मार्ष्टु क्षेत्रियं यपथष्च यः। अपाह यातुधानीरप सर्वा अरायृयः।4/18/7।।*

अपामार्ग औषधि क्षेत्रिय रोगको और जो दुर्वचन का स्वभाव है उसको दूर करे और सब निस्तेजताको दूर करे।

4/20,

त्वयापूर्वमथर्वाणोजघ्नू रक्षांस्योषध। त्वया जघान कष्यपस्त्वयाकण्वो अगस्त्यः।4/37/1।।

हे औषधे! तेरे द्वारा आथर्वणी विद्याजाननेवाले वैद्य रोगकिमियोंका नाष करते हैं। कष्यपने भी तेरे द्वारा नाष किया। कण्व और अगस्त्यने भी तेरे द्वारा रोगोंका नाष किया।1।

प्रस्तुत मंत्र के द्वारा कहा गया है अथर्वन् विद्या के ज्ञाता वैद्य रोग का नाष करता है।।

4/37 सूक्त में जल से उत्पन्न होनेवाले कीड़ा को कैसे विनष्ट किया जाता है उसका वर्णन है।

5/4, 5/5,

How to prevent snake poison according to the Atharvaveda

5/13

ऋषि– गरुत्मान्, देवता–तक्षकः, विषम्

ददिर्हि मह्यं वरुणो दिवः कविर्वचोभिरुग्रैर्नि रिणामि ते विषम्।
खातमखातमुत सक्तमग्रमणिरेव धन्वन्नि जजास ते विषम्।1।
यत्ते अपोदकं विषं तत्त एताखग्रभम्।
गृहणामि ते मध्यमुत्तमं रसमुतावमं भियसा नेषदादु ते।।2।।
वृषा मे रवो नमसा न तन्यतुरुग्रेण ते वचसा बाध आदु ते।
अहं तमस्य नृभिरग्रमं रसं तमस इव ज्योतिरुदेतु सूर्यः।।3।।
चक्षुषा ते चक्षुर्हन्मि विषेण हन्मि ते विषम्।
अहे म्रियस्व मा जीवीः प्रत्यगभ्येतु त्वा विषम्।।4।।
कैरात पृष्न उपतृप्य बभ्र आ मे शृणुतासिता अलीकाः।
मा मे सष्थुः स्तामानमपि ष्वाताश्रावयन्तो नि विषे रमध्वम्।।5।।
असितस्य तैमातस्य बभ्रोरपोदकस्य च।
सात्रासाहस्याहं मन्योरव ज्यामिव धन्वनो वि मुञ्चामि रथाँ इव।।6।।
आलिगी च विलिगी च पिता च माता च।
विभ्र कः सर्वतो बन्धवसाः किं करिष्यथ।।7।।
उरुगूलाया दुहिता जाता दास्यसिक्न्या।
प्रतङ्कं दद्रुषीणां सर्वासामरसं विषम्।।8।।
कर्ण ष्वावित्तदब्रवीद्दिगरेरवचरन्तिका।
याः काष्चेमाः खनित्रिमास्तासामरसतमं विषम्।।9।।
तबुवं न ताबुवं न धेत्त्वमसि ताबुवम्।
तस्तुवेनारसं विषम्।।10।।
तबुवं न ताबुवं न धेत्त्वमसि तस्तुवम्।
तस्तुवेनारसं विषम्।।11।।

द्युलोक के कवि वरुणने मुझे उपदेष दिया है कि बलवान् वचनोंके द्वारा तेरा विष दूर करता हूं, घाव अधिक खुदा हुआ हो या न खुदा हुआ हो अथवा विष केवल उपर चिपका ही हुआ हो, इस सब विषको मैं लेता हूं। रेतीले स्थानमें जिस प्रकार जलधारा नष्ट होती है उस प्रकार तेरा विष निःषेष नष्ट करता हूं।1।

जो तेरा जलषोषक विष है वह तेरा विष इनमें लेता हूं, तेरा उत्तम, मध्यम और नीचेवाला रस पकडकर लेता हूं जो तेरे भयसे नष्ट हो जाता है।2।

मेरा षब्द आकाष की गर्जनाके समान बलवान् है, बलवाले वचनोंसे निष्चयपूर्वक तुझे तुझे ही बाधा करता हूं, मैंने मनुष्योंके साथ इसके उस रसको लिया है अन्धकारसे ज्योति देनेवाले सूर्यके समान यह उदयको प्राप्त होवे।3।

आंखसे तेरे आंख का नाष करता हूं विषसे तेरा विष नष्ट करता हूं, हे सर्प! तू मर जा, मत जीता रह, विष तेरे प्रति लौटकर आवे।4।

हे जंगल में रहनेवाले, धब्बेवाले, घासमें रहनेवाले, भूरे रंगवाले, कृष्ण और निन्दनीय सर्पो मेरा भाषण सुनो, मेरे मित्रके घर के पास मत ठहरो, दूर अपने विषमें ही रमते रहो।5।

कृष्ण, गीले स्थान पर रहनेवाले, भूरे रंगवाले जलसे दूर रहनेवाले और सबको पराजित करनेवाले कोधी सर्पके विषवाधाको मैं ढीला करता हूं जिस प्रकार धनुष्यसे डोरी और रथोंको ढीला करते हैं।6।

चिपकनेवाली और न चिपकनेवाली तथा नर और मादा तुम्हारे सबके बंधुओंको भी हम सब प्रकारसे जानते हैं। तुम नीरस होनेपर क्या करोगे?7।

बहुत हिंसक सर्पिणी की दुहिता कृष्णसर्पिणि की दासी हो गइ है, इन दाद पैदा करनेवाली सब सांपिनियों का कष्ट दायक विष नीरस होवे।8।

कानवाली साही पहाड के नीचे घूमनेवाली वह बोली जो कोइ ये भूमि को खोदकर रहते हैं उनका विष नीरस होवे।9।

ताबुव हिंसक नहीं है तू ताबुव तो हिंसक निःसंदेह नहीं है, ताबुव के द्वारा विष नीरस होता है।10।

तस्तुव भी नाषक नहीं है तू तस्तुव तो नाषक निःसंदेह नहीं है, तस्तुव द्वारा विष निरस होता है।

प्रस्तुत सूक्त में वर्णित सर्प जातियोंका वर्णन

[4] Ibid - 19.38.1-3

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कैरातः–भील जहां रहते हैं उस जंगलमें रहनेवाला सर्प। *पृश्निः*–धब्बोंवाला सर्प। *उपतृण्यः*–घासमें रहनेवाला सर्प। *बभ्रुः*–भूरे रंगवाला सर्प। *असितः*–काले रंगवाला सर्प। *अलिकः*–अमंगल सर्प। *तैमातः*–गीले प्रदेशमें रहनेवाला सर्प। *अपोदकः*–जो जलके पास नहीं रहता। *सात्रासाहः*–इसके संबधमें आनेवाले का नाष करनेवाला सर्प। *मन्युः*–क्रोध धारण करनेवाला सर्प। *आलिगी*–चिपकनेवाली अर्थात् षरीरको लपेटनेवाली सांपिन। *विलिगी*–षरीरसे दूर रहनेवाली सांपिन। *उलगुला*–जिसको निम्न प्रदेष बडा होता है। *असिक्नी*–काली सांपिन। *दहुषी*–जिस सांपिनके काटनेसे षरीरपर दाद उठता है और दादसे रक्त निकलता है। *कर्का*–कानवाली सांपिन। *श्वावित्*–कुत्ता जिसको काटता है, कुत्ता जिसको ढूंढकर निकालता है। *खनित्रिमा*–खोदी हुइ भूमिमें रहनेवाली सांपिन । तावुव और तस्तुव नामक पदार्थ से विष निदान के उपाय बताया गया है। गृह्णामि ते मध्यमं उत्तमं अवमम् मंत्र 2 में उपर, मध्य और नीचे रस्सीसे बांधने की बात कही गयी है जो विज्ञान सम्मत है।

2/7–सहस्र काण्ड वनस्पति, 2/8–तारका, भगवती वनस्पति, 2/9–दषवृक्ष वनस्पति, 2/25–पृष्निपर्णी, 2/27–पाटा औषधी, 3/6/1–खैर, अष्वत्थ वृक्ष, 3/18, 3/23/4–ऋषभक नामक दिव्य औषधी, 4/3/1, 4/1/4, 4/1/5, 4/1/3, 4/7/1,5, 4/9/10, 4/12, 4/17–अपामार्ग औषधी, 4/20, 4/37–अजशृंगी। गुग्गुल, पीलु, मासी, औक्षगन्धी और प्रमोदिनी–4/37/3, पीपल, वट, षिखण्डी–4/37/4, अर्जुन वृक्ष, आघाट और कर्करी वृक्ष–4/37/5, ब्राह्मी औषधी–4/37!11, 5/4, 5/5,

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वैदिक संहिताओं में विविध विद्यायें : डा0 लाल कृष्ण, जे0 पी0 पब्लिषिंग हाउस, दिल्ली, 1993

Talk 6: (Hall 2)

Science and Scientist : Mind, Body Consciousness- Way beyond scientific methodology

Anuja Chouhan, Ph.D.

Professor & Dean, Arni School of Basic Sciences, Arni University, Kangra, H.P., India

Bharat (India) has been rich in its culture and heritage, but we Indians hardly considered or perceived it so in true sense. Somewhere in past centuries we lost our identification with its real wealth and resources.

May be the providence decided it that way and now is the time coming to embrace and imbibe the importance of traditional and ancient wealth that is hidden in vedic literature and ancient scriptures and to review it with whatever modern advancement in scientific knowledge & perspective we have attained. But the point to ponder is weither it can be done with available techniques or methodology, or it's a never ending hope or mirage like believe the way earth and sky meet in the horizon.

There had been two kind of dominant approaches in seeking the knowledge or truth, in west it went on exploring the materialist phenomenon and the so called modern science evolved and most of the inventions & discoveries with modernisation came from west. And other approach had been taken in east which besides whatever developed in outer world explored and gave more weightage to the inner resources of the body and the journey towards self, deepened to the extent that it lost interest towards materialistic approach. May be it apparently couldn't fascinate them as compared to that.

Science and scientific approach have been interested in its surroundings to win over nature so to become master of it, in terms of making life more comfortable, and it certainly been a great contribution to world the way advancement had come up in area of medicine, electrical gadgets, transport, communications etc. life seems to have become interesting and so much convenient. It had been the exploring of material world with ongoing increase in precision and accuracy in terms of physics, chemistry , biology and touching and dealing matter at nano level and DNA level, still seems to be never ending expedition in terms of finding answers to some eternal questions of what is life,or the origin of life and who is the creator or who is running the world and so on....?

In terms of scientific method, Aristotle believed that the best way to understand nature is through reasoning and observations and that knowledge is subject to examination. (Aristotle-biography of famous Scientist). Aristotle set the basic standard for the modern scientific method: that all observations must include the composition ,the shape or form,

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the change, and the end result/purpose of the examination. He dismissed the idea of chance, and spontaneity as fact, and didn't consider them a cause. This method is similar to what is used in most science experiment in labs today. Aristotle's theories of physics started a scientific journey that would lead to the science we study today.

Science itself if to be described is defined as, is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. *"... modern science is a discovery as well as an invention. It was a discovery that nature generally acts regularly enough to be described by laws and even by mathematics; and required invention to devise the techniques, abstractions, apparatus, and organization for exhibiting the regularities and securing their law-like descriptions."—[1]*

"science" as per Merriam-Webster Online Dictionary. :- a: knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through scientific method b: such knowledge or such a system of knowledge concerned with the physical world and its phenomena. [2]

Science in a broad sense existed before the modern era and in many historical civilizations. Modern science is distinct in its approach and successful in its results, so it now defines what science is in the strictest sense of the term.

So the scientific methods concerned with the physical world and its phenomenon can be discussed and argued upon because observations & results are or can be co tested and can be shared among multiple observers as, testing and evidences as well as the laboratory can have the common platform (*Pratyakshya)* and comparable among the observant or scientists employing the mind and five senses {touching, hearing ,seeing, smelling,tasting} or the extended five senses in form of various instrumental techniques.

We have worked on scales & measurements which are inside of the circumference of these senses and their extensions, and so are our labs and experiments are available commonly upto quite far extent and so are the results and inferences. So far we could easily describe and interpret the functioning of objects in three dimension world, mainly and our calculations have successfully taken us up to various planets and spaces. This made us efficient in exploring the science and translating and transforming it into technology because of the commonality of our experiences in this regard which are actually the reproducible observations and experiences. Where actually we are involved or should say mind is involved into exploring and interpreting, employing the five sensory level. The objective world and its knowledge here deal with mind with more of its sensory part extensions.

When we see activities which are skill oriented like a good sportsperson in a game having much more acquired skilled ability than other person, we come to subtler area where mind involved in knowledge through faculty of senses as well as coordination of mind with body t developed together coming into force. Here the observers may not be at the common level of skills because of inclusion of how the mind has been used in coordination with body to develop that skill and experience and outcomes are different for different observers. Hundred people of similar height n stamina, with same hours of practice may not give hundred Sachin tendulkars. They may differ in their playing skills keeping other factors common , mind body coordination factor also playing role where science can not measure or predict it to be precise. Still this area work in the average range because many skill oriented functioning can be developed to the extent of commonality , as are in many skill oriented vocations. It is difficult to define the different skill development level or its commonality level in terms of science or physical phenomenon.

Lets talk of weighing on balance , it's simple scientific phenomenon, almost everybody can weigh same amount of material on balance instrument in lab to the required precision. All experiences and results have the commonality along with the common lab. If we are to define a balance which is attained on bicycle riding, we simply can define scientifically as the state of having your weight spread equally so that you do not fall. But at experiential level for people who don't know bicycle riding it will be different for individuals in terms of result and time taken in getting what balance actually is. And science has limit to get that converted in technology form beside it being a physical world phenomenon. It comes with mind body employed together and to be learned in haphazard manner of weight applying and once it is learnt the person doesn't forget that skill whole life. Balancing on bicycle can not be transferred in written description to be reproduced successfully in first attempt by number of different experimenters. As involvement of mind is increased here in this activity with additional factor of mind body coordination into it and which can not be transferred in technology form ,as the lab (which is mind, in coordination with body) in utilisation too is partially different for each observer.Even we can provide the definition of balance as "an even distribution of weight enabling someone or something to remain upright and steady, one can not do it merely by understanding it theoretically , until has not mastered it with sufficient amount of efforts.

If we go further to take subtler examples beyond five senses as well as body coordination involvement and want to define emotions of love or happiness where the mind subsidiaries whether heart or otherwise is involved more in quantitative terms than the involvement at sensory observation level and mind body coordination ,then again it is inexplicable and can not be conveyed in terms of formula form or measured to transfer as technology to receiver scientifically. It is rightly

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stated that no materialistic objects on its own can produce the emotion of happiness or love , otherwise the same object which is making one person experience happiness, may be the object of giving experience of sadness or pain to other person. So that too is under the functional premises of the mind only, beyond senses where more compartments than skill oriented mind body coordination ability is in implementation as in learning of balance in previous example. The love even if explained in qualitative form to be more with one person than other neither can be measured or defined scientifically.

As per these three activities of a)) doing scientific experiment in lab viz weighing on balance and drawing inferences, b)) balancing on bicycle riding or game skills and c)) emotion of love we find gradual shifting and increase in dependency or involvement of mind from outer world at sensory level, to body mind relation, to mind faculties only and therefore involving or shifting to mind lab where each individual has its own experiences and inferences or qualifications. It may be further extended to explore in mind lab itself , its other faculties and new findings which might be independent of outer world laws and methodologies as well as the outcomes.

Currently we can easily define & understand the three dimensions and logically the two dimensional phenomenon wiil be difficult to explain in terms of one dimension, and three dimensional experiences will be different in two dimensions . Experiments are to be defined and designed according to availability of range of limits. Science has been stretching its limits with increasing availability of so many advancements in techniques and instruments . We are exploring substance and devices building at and Nano & DNA level., Genetic engineering techniques have been applied in numerous fields including research, agriculture, industrial biotechnology, and medicine. An organism that is generated through genetic engineering is considered to be genetically modified (GM) and the resulting entity is a genetically modified organism (GMO). The first GMOs were bacteria generated in 1973 and the first GM animals were mice in 1974. Insulin-producing bacteria were commercialized in 1982 and genetically modified food has been sold since 1994. GloFish, the first GMO designed as a pet, was sold in the United States in December 2003. [3].

Biological engineering uses primarily the rapidly developing body of knowledge known as molecular biology to study and advance applications of organisms and to create biotechnology. This may eventually include the possibility of biologically engineering machines and 3D printing that re-order matter at a molecular scale. Physicist Richard Feynman theorized about the idea of a *medical* use for these biological machines, introduced into the body, to repair or detect damages and infections. . Feynman and Albert Hibbs suggested that it might one day be possible to (as Feynman put it) "swallow the doctor". The idea was discussed in Feynman's 1959 essay.[4]:

Most genetic engineering involves bacteria. The first step in genetic engineering is to remove the gene you are interested in from its host organism., and use it further with modifications etc. Inspite of all achievements the threshold is still not crossed over and still far away from describing the sentient part that is life. But Inclusiveness of sentient part is developing resulting into subjects like *Cognitive biology*, is an emerging science that regards natural cognition as a biological function. [5] Van Duijn, et al. (2006). "Principles of minimal cognition: Casting cognition as sensorimotor coordination.". It is based on the theoretical assumption that every organism—whether a single cell or multicellular—is continually engaged in systematic acts of cognition coupled with intentional behaviors, i.e., a sensory-motor coupling .[6].

The *Cognitive sciences* currently represent such an example, attracting the interest of armies of young investigators from established disciplines who are bringing their expertise and efforts to solving the conundrum of the mind. This happened in at least three waves over almost fifty years. The first wave, in the 1950s, overtook behaviorism and established the field; the crucial keyword of this wave was information The second wave brought matter and energy to the fore in the 1970s; the crucial keyword of this wave was "brain." The third wave, the one contributing to the picture this book plans to portray, brought in evolutionary theory and developmental issues: the crucial keyword of this wave is change".[7] Cognitive Biology -Evolutionary and Developmental Perspectives on Mind, Brain and Behavior., edited by Luca Tommasi, Mary A. Peterson and Lynn Nadel.

There is scope of turning of science to explore Mind , which had been the most powerful yet incomprehensive and yet to be explored.

As the Mind is the common factor in use, needs to be explored using methodologies which were used by people who could explain or pointed towards truth which is still inexplicable according to modern science. Mind can be the point which can take towards consciousness inward and or outward to worldly matter.

Consciousness, which the Vedanta calls chetna, pragna etc. As per Vedanta, This chetna is a thing which is neither matter nor energy. Being other than energy and matter. It is called spirit, or the spiritual substance. To cause knowledge and activity is its power. The moment the chetna ceases its operation in the body both activity and knowledge also cease abruptly.[8]

Ayatasu gatasu shaishava-mukhavasthasu jagranmukha-
Svanyasvapy-akhilasu vrittishu dhiyo dushtasvadushtasvapi I
Gangabhanga-paramparasu jalavatsattanuvrttatmana-
Stishthatyeva sada sthiraham-ahamity-ekatmata sakshina ; II
Sarvavedantasidhantasarasangraha 614

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Ever since birth, the body has passed through a number of a stages like childhood, boyhood, etc. The mind too is passing through wakefulness, sleep and dream, almost daily. The buddhi(the chetna) produces a number of conditions or reactions called good or bad, soothing and painful, etc. Thus , it is a chain of changes that persists in our being outside and inside. Yet ,there is one thing , the witness of all these changes, which remain ever steady, as does the water in the flow of Ganges. This witness reveals itself in the form of "I'. O man, you are really this ever –steady 'I', the Self, not the unsteady media like the body, mind etc.

The Chetna or counsiousness upon which" I " persists is not limited in any respect. It is all pervading ,As it permeates the body throughout ,it also pervades the whole of the world and all the things in it. As Krishna describes it, It is *avinashi* (Indestructible) :

Avinashi tu tadviddhi yena sarvam-idam tatam I
Vinasham-avyayasyasya na kashchitkartum-arhati II
Bhagavadgita 2.17

Know the thing, which permeates everything here (in the world) to be indestructible. None indeed can cause its destruction.

To travel whole world or universe to find what pervades or permeates it, is impossible for us. Such attempt is by its nature, beyond our scope. But search into our own being or personality lies strictly within our power. Krishna uses the word (avinashi) while referring the whole world. That means there is altogether only one thing permeating the objects of the world. Our body is one of the objects. What is found permeating our body must ,hence be permeating all things in the the world. It becomes the all permeator, the all pervading factor, *sarva –vyapi*.[8] And this to be explored by observer or scientist using the mind lab available to experience and realize. For which available scientific methods or the lab may not be necessary as the lab ,each one has as the mind itself.

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Talk 7: (Hall 1)

Rasayana: An Ayurveda Approach For Longevity

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INTRODUCTION

Rasayanas are the "wonder" drugs that aid in increasing your natural immunity, enhancing your general wellbeing, improving the functioning of all fundamental organs of the body, and keep the signs of early aging at bay.

The word *rasayana* is made up of two words: *rasa*, which means humor of the body, and *ayana*, meaning source. Rasayana is therefore regarded as the source of all the body humors.

This therapy occupies a prime position in Ayurveda and abides as a distinctive branch that deals with maintaining and ameliorating the body functions, including those of the brain.

Types of Rasayanas

Rasayanas have been categorized in two basic types:

1. ***Dravaya Rasayana***: This type of Rasayana therapy includes some herb and food types that are indeed beneficial for the optimum functioning of the body as well as the brain.

There are four types of dravaya:

Age-promoting Rasayanas: Some herbs and diets are believed to be of great help in providing stability to life, vitality, and stamina by helping with body and mind fatigue and by augmenting the power of all the five senses. Not only this, these rasayanas provide glow to the skin, sweetness to the voice, and virtually tend to enhance the life span of an individual. Chyavanprash is a popular rasayana, which can be cited as an example, the use of which had restored back youth to Rishi Chyavan.

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Brain power enhancing Rasayanas: Regular intake of cow's milk and ghee (clarified butter) is an effective brain tonic. There are herbs like bramhi, vacha, and shankhpushpi, as well as Ayurveda medicinal formulations like bhrama rasayana which can be taken for long periods of time so as to increase the mental powers of intelligence and memory. Also, these have a stimulating action on the entire central nervous system. Guduchi rasayana is also intellect-promoting and has shown results in promoting powers of grasping, concentration and retention, and also in fighting mental fatigue.

Eyesight promoting Rasayanas: There are some Ayurveda herbal formulations categorized specifically for the benefit of the proper functioning of the eyes (for example, aamalki rasayana). These not only aid in providing clear vision, but also are great of help in problems of decreased eyesight.

Disease combating Rasayanas: In this type, specific rasayanas are given to the patients suffering from some particular disease so as to help eradicate the disease from its roots. For example, bhallataka rasayana is used in diseases of skin and leprosy and pippali rasayana is for respiratory diseases.

2.***Adravya Rasayana***: In this type of rasayana therapy, there is no conventional use of medicines. Only the general rules of living and natural regimen of seasons is to be followed. This therapy works in accordance to the science of naturopathy. Man and nature are regarded to be maintaining maximum similarities. Therefore, the laws of nature are inherent in human body. This is the basic idea behind the use of this rasayana therapy.

Let me suggest that for the overall accomplishment of the merits of rasayana therapy, it would be best if both the dravaya and adravya rasayanas are used concurrently.

How to Take Rasayana

Indoor Arrangement: The rasayana therapy is made available to the patient while he is staying in a sanatorium or a health resort. This type of arrangement is extremely beneficial as the general rules and principles in taking the rasayana can be easily maintained here. And as this method strictly abides by the laws of nature, positive results can be obtained in shorter period of time. In Ayurveda, treatment provided in this type of health spa is regarded as kuti rasayana, with kuti meaning "a hut."

Outdoor Arrangement: Because of scarce availability of time, resources and finances, staying in health resorts may not be suitable for most of us. In this case, natural living would all by itself work as a rasayana for you. The use of sunlight and fresh air for long periods of time is the easiest available source of rasayana therapy.

Benefits of Ayurveda Rasayana Therapy

There are many advantages to rasayana therapy:

*Rasayana therapy aids in reviving the health of a healthy person as well as in combating the disease of the diseased one.

*It enables the body to develop its own vital energy or the defensive mechanism against disease.

*Rasayanas are believed to build a barrier against stress and infection.

*These act principally by strengthening the immune system of the body acting as both brain and body tonic.

*Clinical studies have proved rasayanas to be anti-toxic and anti-infective drugs.

*These are perhaps the only 'wonder' drugs that can be taken safely for long stretches of time, even in a healthy state, without any specific contradictions.

Some Important Rasayanas

Herbs and medicinal plants: aamla (emblica officinalis), haritaki (terminalia chebula), guduchi (tinospora cordifolia), ashwagandha (withania somnifera), nagbala (grewia hirsuta)

Amalaki : is an herb famous for its rich Vitamin C content has also attained its popularity due to its bulk presence in chyawanprash. Amalaki possesses certain chemicals like gallic acid, ellagic acid, chebulinic acid, quercetin, chebulagic acid and corilagin that provide it with the power to act as an antioxidant. According to the Ayurvedic point of view, due to its cold potency and presence of five tastes, it is very helpful in avoiding oxidation of the cells.

Haritaki : has a hot potency and has five tastes. Botanically Haritaki is known as Terminalia chebula. The herb is famous for its astonishing healing power and its wonderful results in treating many diseases.

Asparagus : A rich source of vitamins and minerals, asparagus contains glutathione, a powerful antioxidant that is very helpful in reducing free radical production. Glutathione has been involved curing the thirty types of cancers. It is also a powerful agent, which is helpful in treating diseases of cardiovascular system and respiratory system.

Triphala : This is not a single herb but a uniqueness of ayurveda and its power of treatment. Triphala is a miraculous herb combination that has gained its popularity as the most successful antioxidant. Triphala contains a mixture of three prestigious herbs Amalaki, Haritaki and Bhibitaki. Triphala is considered as the a divine medicine that has gained a respect as the drug of choice for treating almost every disease that exist on the face of the earth

Aswagandha : Ashwaganda increased physical endurance, prevented the stress-induced depletion of vitamin C and cortisol, and prevented stress-related gastrointestinal ulcers. In Sanskrit, ashwaganda means "the sweat or smell of a horse," indicating that one who takes it will gain the strength and stamina of a horse, some even say ten horses. It is quickly becoming well-known as an herb for fighting stress and promoting energy and endurance.

Natural resources: loha (iron), swarn (gold), shilajit (black bitumen), praval (coral ore), mukta (pearl), tamra (copper), rajat (silver)

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Shilajit - Shilijit is also called yogavahi, which means it strengthens and enhances all herbs and processes in the body. Although how it does this is not fully understood, it is believed that the porous fulvic and humic acids in shilijit carry herbal compounds deep into the tissues of the body. These porous transport cavities may also hook toxins and escort them out of the body. It is a known free-radical scavenger, anti-stress agent, and powerful adaptogen

Food ingredients: honey, cow's milk, desi ghee (clarified butter)

Ayurveda medicinal formulations: Amlaki Rasayan, Brahma Rasayan, Chyanprash avleha Rasayan, Amrita rasayana, Abhya rasayana, Pippali Rasayan etc.

Conclusion

To conclude this article I will always prefer all the reader of this article to definitely try the herbal and herbomineral antioxidants so as to achieve the maximum benefit without facing any harmful side effects of the chemically prepared antioxidants. Feel the power of ayurveda in your life!

Talk 7: (Hall 2)

Uncertainty: Physiological Approach Towards The Issue Of Existence Of Creator

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The world runs on uncertainty. Obviously, uncertain science explains uncertainty with certainty. Prediction of events on the basis of science is still impossible. According to recent experiments in the field of quantum mechanics theories such as Heisenberg's uncertainty principle support the statement. According to the laws of thermodynamics, the entropy of the universe is increasing. We are moving from a organized state to a disorganized state. Thus, nothing can be controlled within a time period. We perform every work with uncertainty because we are in a sense controlled by someone else.

If we ask ourselves the reason of existence in this world, we end up without any answer and thus, our chain of knowledge ends up at that point. If we are urging to find the creator of this universe, we will never end up in that process.

Modern physics began its search for truth of nature by isolating mind and soul from matter and sought the truth in matter. The major hypothesis in physics relies on this major issue. We are not able to explain true reality of science due to this fact. The work of Newton and Galileo is not considering the major issue.

The blemish in modern science is that most of the scientists misunderstand the meaning of God. They always come up with a point against the notion. But obviously, they are misleading. Something that is controlling each and every process we perform is called God. Science must undergo in a path to achieve God rather than just explaining materialistic reality of life. Life is controlled by soul. The transfer of energy creates a system where we live. But do we really understand the true meaning of energy? Where is its origin? Why is energy given to us to perform any task? What is life and what is death? Is 'consciousness' just our perception of controlling nature according to our desire?

Digital approach of a creator

Let us experience a thought experiment in which a human creates a robot. It has been possible in this modern era with the use of logical circuits such as transistors, wires, capacitors, resistors, diodes etc. But how will the robot do something? How will it gain consciousness? And what is actually 'consciousness'? Is it human created terminology?

The logical part which actually controls the robot is done through programming methodology involves series of logical sequences that is human implemented approach. It is most important aspect for the working of robot.

Now in this thought experiment, if humans who created the robots would extinct by providing all logical aspects as that of humans, what would happen? Would the meaning of consciousness change?

A robot would be conscious relative to another robot because it could perform some specific task. If they try to understand the reality of their existence, they would conclude that their life is a result of a bunch of transistors which are maintained in a specific order. But they will not understand how their logic was actually created.

Now, let us compare the thought experiment with our reality. Isn't it similar? We are in the same state of mind which the Robots are experiencing in my thought experiment. Biology is active in only understanding how the systems of cells work rather than understanding why they work. They are truly lacking in this field. The chain of creation moves on and on. But what is actually the nature of reality, is the question which Science too, is unable to answer.

Is our conscious mind controlling the whole universe?

Yes Definitely. Everything that exists in our world is relative to the other and consciousness creates reality. Does this mean we can shape and create whatever reality we like for ourselves? Does it mean we can manifest a certain lifestyle, and attract certain experiences? Does it happen instantly? Does it take time? How do we do it? The Vedic tradition is one of the oldest

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traditions of knowledge in the world and it is a major process of achieving this level of knowledge.

So, instead of running for the materialistic approach, Science should find a way to interlink Vedic Science with it so that purest form of knowledge can be achieved. Science is a means and method to understand and utilise the powers manifest in the physical world. The Veda is a record of experiences and powers and states of consciousness that make up all of existence, both the seen and unseen. While the starting point of science is objective reality, the Veda launches on its journey with the subjective view as starting point. While science depends on limited reason, the Veda has its intuition and other means of acquiring knowledge and power and joy.

Talk 8: (Hall 1)

Consciousness as a Problem of the Psychological Science

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Abstract
The article discusses the problem of the genesis of consciousness as the ontological characteristics of a person. On the basis of the interpreted concept of hylomorphism (Aristotle) and the theory of change (Prigozhin), it is suggested that the matter, the objective world are originally capable of self-organization and self-formation. It is reasoned that, unlike as suggested by the views of Plato and Aristotle, self-formation gives to the matter, the objective world the ability to generate both *ens originarum* (primordial being) (genetically original relations between the form and the matter) and *ens summum* (entities of higher order). Based on above, it is concluded that the consciousness of a person is a relation between an ideal and a real forms of the objective activity as his/her existence and represents the highest being of the objective world.
Key words: consciousness, self-formation, primordial being, genetically original relation, hylomorphism, substrate relation, reflexive relation.

Introduction

Absence of an acceptable theory of consciousness in philosophy and psychology is related, in our point of view, to an erroneous approach. The attempt to comprehend the consciousness as a ***relation to*** the objective world (from the epistemic point of view) engenders many issues. In particular, it seems impossible to establish the natural source of the origin of consciousness. Besides, that attempt brings about a lot of controversial concepts concerning the absence of the qualitative difference between an animal and a human. From that point of view, a historical specificity of a human is denied; an adaptive nature of existence, the same as an animal's, is ascribed to a human being. Finally, and probably, most importantly, it is impossible to overcome the verge of contraposition of the natural and artificial in a person, even if few would dispute that the human being is a product of nature, a natural being. An assertion of a social and biological nature of a human is more common, with a failure to establish the relation between the biological and the social aspects in a person.

From our point of view, solution of the issue could be found in the ontological point of view, through consideration of the consciousness as an internal (existential) relation ***inside*** the objective world itself. Such approach allows establishing a genetic relation of the consciousness of a human with the internal ontological relation of the objective world itself.

Human being as scientific problem

Some researchers believe that " … the humankind in general goes through a certain transitional period … " [1, p.62]. It is hard to disagree with that point of view. To us, it means that the moment came when the idea of an adaptation exhausted itself as an explanatory principle of a human existence. There is a strong need in a scientific explanation of the origin of a human being who is able to generate forms of his/her own existence just as the nature generates its forms of existence: " … form (*forma* in Latin) is a pattern of organizing and a pattern of existence of a subject, a process, a phenomenon … " [2, p.383].

Contemporary theories of a human are unable to help in solving this problem since they are based on the assumption that a person acquires forms of his/her existence externally, as the products of somebody's work that are external to him/her. Unfortunately, all more or less known systems of education are based on that assumption. At best, the source from which an individual takes his/her forms, is presented as the society or the culture. At worst – heredity: " … the individual finds the abstract form ready-made; the effort to grasp and appropriate it is more the direct driving-forth … " [3, p.77].

Since the culture, the society and the genetics act as external factors for a human being, that eventually leads to a paradox. Instead of becoming the sources of development of the abilities of a human being, they become his/her limits and borders which an individual is not able to overpass. However, as a human being is a product of the nature and bears its primary ability – the ability of self-formation, i.e. the ability to generate his/her new forms as his/her new possibilities, the ***first problem*** emerges:

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" ... since the world that surrounds us is not constructed by anyone, a need arises to provide such description of the world... which would explain the process of self-construction ... " [1, p.47].

Solution of the first problem allows solving the ***second problem***: despite acting as a subject in the history, generating specific historical forms of his/her social and cultural environment, in the society the human being acts as an object formed by the social and cultural environment. What seems interesting to us is the point of view about existence of a substantial contemporary psychological issue: " ... the main sores of the world order...: expansion of the techniques of ***channeled alteration of the human psyche and behavior*** ... " [4, p.15].

Based on that three problems, the motivation of writing this article lies in the need to solve a psychological and pedagogical problem of upbringing a person who would be able to generate the forms of his/her own existence and generate social and cultural environment through such self-generation. That is, the need of upbringing of a person who would be able to overcome any natural and sociocultural limits and borders.

In our opinion, the necessary solution may be found as a result of reconstructing the history of origin of consciousness: " ... History of development of life ... maps out for us the way that brought us to establishment and arrangement of the consciousness [5, p.8] as a fundamental ontological human quality: " ... The limit dividing a human being from animals is the consciousness, or, more precisely – reflexive consciousness ... " [6, p.18].

That can be done only with the use of the historical method based on the conviction that the consciousness is a product of implementation of a certain internal factor of the developing objective world (matter) and is not brought to the nature as an alien givenness from some external sources. Everything in the history is the products generated by the internal origin (being) of the developing world itself: " ... In Aristotle the cause of production and generation is the essence ... " [3, p.156]. If the basic fundamental relation of the form and matter is to be understood as an internal origin (being) of an integral objective world, i.e. to maximally enhance the understanding by Aristotle himself of that relation: " ... According to Aristotle, for our cognition the singular existence is a combination of the "form" and the "matter". In the plane of existence, the "form" is the essence of an object. In the plane of cognition, the "form" is a notion of an object ... " [7, p.12], it may be affirmed that at the dawn, at the very beginning, at emergence and in the process of formation of the objective world, a certain proto-consciousness existed as an ontological characteristics of the entire integral objective world.

But it is only in a human being that it was fully fulfilled and acquired its full-fledged universal generating existence.

Hylomorphism and solving the problem of a human being

In our postindustrial time, it is time to admit that the conventional (since classical times) division of scientific theories into idealistic and materialistic ones is fundamentally erroneous. That error may be eliminated by applying a concept of the Aristotle's hylomorphism and then expanding it to the entire integral objective world: " ... the meaning of Aristotle's ***hylomorhic*** understanding of the soul and body as elaborated in the treatise *On the Soul*, especially where the relation is the relation of the form to the matter in the constitution of an individual organism ... " [8, C.17]. For the science that would mean that originally the internal world is both not material (not real) nor ideal. Originally, the world potentially and actually is an ideal-material integrity.

The point is that the peculiarity of the inanimate nature is that its internal ideal-material origin is hidden by the external material origin.

That means that the scientific reconstruction of the history of the objective world has to begin with the construction of its ideal-material essence. This is when the logic of reconstruction has to show how the hidden internal-ideal aspect gradually emerges outside and shapes, along with the reality "as it is", an ideal reality.

With all that, the process of historical development of the ideal-material world has to be considered as a process of fulfillment of the internal principle of the internal hylomorphic essence in the result of which the form that originally existed only directly with the matter as with its body, its carrier, its substrate, and was inseparable, indivisible from it, gradually and consistently separated and divided from its substrate and transformed into a relatively autonomous, substrate-less, ideal reality.

Relation between the form and the matter as the essence of the objective world

If the Aristotle's hylomorphism is to be interpreted as an assertion of the formal-material essence of the world as a whole and expand that provision to the entire integral objective world, to all specific historical forms of the objective world, including the human being, there emerges a possibility to bring out the consciousness as the essence of the human being from the essence of the integral objective world.

As argued by Alfredo Ferrarin in his *Hegel and Aristotle*: " ... For Aristotle, all that is under investigation is the composite of soul and body ... " [3, p.226]. Also, " ... this inseparability of soul and body is the ... activity ..." [3, p.343].

If we adopt this reasoning and take into consideration that the provision of the originality of the unity of the form and matter is primary for that assertion, we can also believe that the genetically original primary structure of the form/matter relation acts as the essence of the subjective world. That means that actually " ... " ... "nature contains the Idea in itself' ... " (Hegel) ... " [3, p.401]. With that, " ... Aristotle does not deduce reality from ideality ... " [3, p.299]. Originally, both reality and ideality of the objective world potentially coexist as the equal components of its essence.

That is when we can say that the ability of the objective world to self-develop represented as transformation of potentiality into actuality is given through this structure: " ... For *all* substances, essences are the causes that make potentiality actual; the "proximate matter and the form are one and the same thing, the one potentially, the other actually" ... " [3, p.175].

This self-development represents a historical process of generation by the objective world of newer forms, where " ... every form becomes matter to the superior form ... " [3, p.404].

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For a human being that means that " … Man makes himself what he ought to be … " [3, p.305].

At the historical border of the transition from an organism to a human being a qualitative self-change of the essence of the objective world takes place that affirms such qualitative difference of a human being and the human world from an organism and the animal world that: " … Hegel discards the deceiving emergence of similarity between men and apes: the gap between man and animals is absolute, not a matter of degree … " [3, p.386].

Problem of the origin of the primordial being of the objective world

Normally in the cases like that, during a reconstruction of the development processes, an origin problem arises. In particular, the problem of the primary connection between the form and the matter. It is clear that pointing to a divine origin of such primary connection would not work for a scientific synthesis [7] [9]. To the same extent, the genetic mechanism of inheriting such primary connection is hardly suitable.

It is necessary to find a "materialistic" explanation of the origin of primary forms and primary substrates. Such explanation exists: " … How a structure can emerge from chaos? There are considerable advances in finding the answer to this question. We now know that the nonequlibrium – a flow of matter or energy – may act as a source of order … " [1, p.36].

The antiquity's tradition was to consider the matter as a passive, inactive reality [7] [9]. The same point of view migrated to the conventional science: " … the paradox of the conventional science. It opened to the people the dead, passive nature, whose behavior may be with good reason compared to a behavior of an automatic machine … " [1, p.45].

In reality, however, the nature initially has a certain activeness, productive ability. I. Newton already shared that point of view: " … for Newton, the nature was not just an automatic machine but a carrier of a proactive productive origin … " [1, p.9]. Moreover, it is currently considered that " … the matter becomes "proactive": it generates irreversible processes and the irreversible processes organize the matter … " [1, C.37].

To the question of the origin of the form, Aristotle gave the following answer: " … Where does the "form" come from in the matter? … . … what the "form" comes from is neither an absence of the "form" nor the already existing, actual "form", but is something in the middle between the absence ("voidness") of the "form" and the actual "form". This "in the middle" between the absence of existence and the actual existence is, according to Aristotle, the existence "in possibility" … " [7, p.14].

Unlike Aristotle (and, of course, Plato), who believed that " … the "form" of each object is eternal: it does not emerge and does not die … " [7, p.13]; " … It is Aristotle who insists that forms are non-generated … , and that matter in itself is unknowable … " [3, p.165], the contemporary synergetics claims the opposite. It claims that the matter itself bears in itself possibilities of emergence of forms and, under certain conditions, generates its own forms which, in turn, act as determinants of its own development: " … It is the form of development which acts as the factor directly determining a specific process of development, the turning of undetermined variability of the developing object into direct pre-conditions of a new one and their fulfillment … " [10, p.33].

It follows herefrom that, generally speaking, there is no such thing in the nature as the form-less, structure-less matter: " … The presence of the space-time structure is a universal and fundamental property of the matter … " [11, p.17].

That way, the problem of the primary form is solved not by bringing it to the objective world, to the matter from the outside, but by generating by the matter itself of its own forms, all its essences. Such mechanism of self-formation works at all levels of development of the objective world: " … at any level, be it the theory of elementary particles, chemistry, biology or cosmology, the development of science takes place in a more or less paralleled manner. In any scope, the self-organization, complexity and time place play an unexpectedly new role … " [1, p.51].

This suggests that the nature, the objective world is actually a reason of itself: " … Under the name of self-causation (causa sui) I [*B.Spinosa. – V.A.*] I imply that whose essence involves existence … " [12, p.3].

One of the creators of the contemporary synergetics A.R.Prigozhin notes the self-organization ability of matter as a forms-generating process. He " … emphasizes a possibility of ***spontaneous*** emergence of order and organization from disorder and chaos in result of the ***self-organization*** process … " [1, p.18]. It is exactly in result of self-organization that the matter acquires diversity and thus new possibilities: " … it is the organization that endows the system with its inherent diversity … " [1, p.24].

At the core of the self-organization ability lie so-called dissipative structures. It is believed that therein emerge irreversible processes which " … are the sources of order …" [1, p.25].

" … We now know that new types of structures may emerge spontaneously far from the nonequilibrium. In strongly nonequilibrium conditions a transition from the disorder, the thermal chaos, to the order may take place. There may emerge new dynamic states of the matter reflecting the interaction of the given system with the environment. We named such new structures "***dissipative structures***" … " [1, p.54].

Also, " … irreversible processes generate high levels of organization … " [1, p.25].

Under nonequilibrium conditions, the function of entropy changes cardinally " … entropy is not just an uninterruptible sliding of the system to the state void of any organization whatsoever. Under certain conditions, the entropy becomes the progenitor of the order … " [1, p.25]; " … Under nonequilibrium conditions, the entropy may produce not the degradation but the order, the organization, and, eventually – life … " [1, p.26]; " … notion of the entropy as the source of organization means that the entropy loses the quality of a stiff alternative arising before systems in the process of evolution: as some systems devolve, the others evolve and achieve the higher level of organization … " [1, p.26].

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That way, the synergetics [1] [13] gives us reasons to believe that under certain conditions the matter is able to generate the forms that determine its own existence.

The act of development (self-development) of the matter may now be presented as follows: " … According to the theory of change generated from the notion of the dissipative structure, when the system in a highly nonequilibrium state is affected by fluctuations that threaten its structure, a critical moment arises – the system achieves the point of bifurcation. … in the point of bifurcation, it is essentially impossible to predict to which state the system will pass. The accidentality pushes what remained of the system to the new path of development and after a path (one of many possible paths) is chosen, the determinism comes into effect – and it goes on before the next point of bifurcation … " [1, p.28].

The inference of the authors seems notable. It is straightforwardly directed against biological or social reduction of a human being, which is very important from the point of view of the problems presented by us at the beginning of this article: " … The authors of the theory caution against taking genetic or socio-biological explanations of mysterious or obscure aspects of social behavior. A lot of what is normally attributed to the action of mysterious biological strings is in reality generated not by "selfish" determinist genes but by social interactions ***in nonequilibrium conditions*** … " [1, p.29].

The methodological conclusion made by the authors also seems very important to us: " … In our days, the main emphasis of research shifted from substance to relation, connection, time … " [1, p.49]. This emphasis is what beacons us in the process of solving the problem of the human being who generates his/her own forms.

Simultaneously, a prospect emerges for solving a pertinent problem of our time, that is the problem of correlation of the approaches of the natural science and humanitarian ones: " … the clash between what is conventionally called "two cultures", - between natural sciences and the humanitarian knowledge … " [1, p.52].

History as the process of transformation of the substrate connection into a reflexive relation

The basic premise of the analysis of the consciousness origin history is that of the integral world as originally having internal and external forms already at the very beginning of its own historical development process. For that matter, the historical development itself could begin only when the primary being of the world had been fulfilled as the basis relation (a direct connection at first) of the form and matter.

That is exactly the consequence of the ***interpreted*** concept of the Aristotle's hylomorphism [7] which asserts the fundamental structure of inter-correlated form and matter as the essence of all things in existence and the objective world. If we recall the never finished "Dialectics of Nature" by F.Engels [14], it may be taken in consideration that the objective world, the matter in its development, in its historical evolution, goes through certain stages of development itself. These are the so-called historical forms of the (objective) world (mechanical, physical, chemical, biological, social form of the objective world etc.).

Also, " … the higher kind contains in itself the lower, and that the lower exists potentially in that which follows … " [3, p.333].

Each historical form of the objective world is characterized by its unity (total affinity of all its particular singularities) being provided by its internal form-generating being. It is that internal potential formedness that allows speaking about the general way of existence of specific definite components of the matter.

Each form of the objective world has its own internal essence (internal form). This internal form pre-conditions a characteristic external form that presents a particular type of interaction of characteristic objects.

At the stages of inanimate nature, the internal form of the objective world exists directly inside the external form, is directly merged with its external form, indivisible from its external form, does not have its own autonomous reality and is hidden from cognition by the external form. Here the internal form (principle of interaction of inanimate objects) cannot be in principle detached from its external form without disrupting the objective world itself.

At the stages of the animate nature, the internal form exists already not as form of the body's substrate but as the form of the body's activeness. The real form of activeness of an animate creature, its actual behavior processes and their actual results become the external form of the internal form. With that, the internal form of activeness is determined by the internal form of the animate body's substrate (its structure). The form of activeness of the animate body exists in a form of the body as in its substrate and is determined by the form of the body's substrate. Without its substrate, outside of the body, the activeness form cannot exist. By destroying the form of the body we destroy the form of the body's activeness. The form of the animate body's activeness is indivisible from the form of the animate body. The form of activeness directly coincides with the form of the body, representing one and the same thing. The form of the body's substrate is the substrate of the form of the body's activeness.

This direct substrate connection between the activeness form and the animate body form cannot be broken without destroying the body itself, i.e. without killing an animate creature.

With emergence of the human being in the history, this direct connection between the activeness form and the animate body form is disrupted. However, the disruption of direct substrate connection does not mean disconnection from the nature; it means liberation from the dependence on nature: " … This liberation is not epy liberation from nature but from our dependence on its immediacy and externality … " [3, p.356].

The ***expedient activeness*** of the organism transforms into the ***goal-setting activity*** of a human being. The substrate connection transforms into a substrate-less relation that represents a mediating work of the reflexive consciousness. In its turn, the mediating activity of the consciousness

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produces and reproduces an ideal realm in which now exists the form of the body's activity "alienated" from the acting body.

Consciousness as *reflexive relation* between ideal and real forms of the human goal-setting activity

As noted above, " … In our days, the main emphasis of research shifted from substance to relation, connection, time … " [1, p.49]. That position is very close to our research approach. In this connection, it has to be noted straight away that we consider consciousness as relation. It is not, however, the relation to the reality (as epistemological relation), but the relation inside the reality itself (as ontological relation): " … Consciousness is not the knowledge about existence and not the relation to it but the conscious (i.e., not instinctive, as in animals) existence … " [6, p.181].

With that, " … The human being exists as a person, as a subject of the activity aimed at the surrounding world and at himself/herself, since and as long as he/she actively produces and reproduces his/her real life in the forms created by himself/herself, by his/her own labor … " [15, pp.219-227].

Such point of view inevitably follows from recognizing the genetically original basic relation between the form and the matter (relation between ideality and reality) as the essence of the objective world and the human being.

We thus believe that the issue of consciousness has to be tackled not as epistemological (issue of cognition) but as ontological (existential issue).

As all things in the objective world, its essence also develops through transformation. Being a genetically original substrate connection between the form and the matter, at the transition from the organism to the human being it is transformed into a relation between the ideal and real forms of his/her existence. If the existence of the human being is to be understood as his/her activity, action: " … True existence of the human being… is his/her action … " [16, p.172] " … what a person does is what he/she is … " [17, p.154], the internal relation between the real and ideal forms of the essence of the substantive work of the human being becomes his/her essence that expresses the essence of the subjective world.

Thus, consciousness as a correlation between ideal and real forms inside the human existence reproduces genetically original relation between form and matter inside the existence of the objective world.

There a certain sense in considering the consciousness as a relation. This sense comprises the following.

Firstly, in that case the consciousness becomes a substantial criterion of differing a human being from the rest of the animate and inanimate world.

Secondly, consciousness acquires existential status correlated with the essence of the integral objective world.

Thirdly, consciousness as reflexive activity acts as a mechanism of generation of ideal forms from real forms and as a mechanism of determining real forms by ideal forms.

Fourthly, the internal mechanics of the origin of ideal reality is exposed.

However, in order for the internal relation of the objective world to acquire a status of human consciousness, the history had to disrupt the genetically original substrate connection between form and matter and transform it into a reflexive relation between ideal and real forms of the goal-setting activity.

It is at that historical point of bifurcation that the organismal expedient activeness went through a qualitative transformation and was transformed into a human goal-setting activity: " … the activity is in no way a particular form of activeness (e.g., its "human form" etc.). It is impossible to come to the activity by trying to construct it from activeness, no matter how hard we try … " [18, p.169].

The problem of consciousness is not just the problem of origin of consciousness in history, but also another problem, possibly just as important – the problem of origin of consciousness in ontogenetic aspect. The problem of ontogenesis of consciousness is the problem that seems to be the most important to us in the contemporary psychological and pedagogical science.

Just like in the history of consciousness, the most important problem in ontogenesis of consciousness is the problem of origin. In these terms, the works of A.R.Prigozhin throw light on a possible solution. It becomes clear at least that at the very beginning of the ontogenetic path it is necessary to set the need of emergence of ***irreversible processes*** of the development of a child and thus begin to form a so-called ***"arrow of individual time"*** (Fernand Braudel).

Unlike "human-less" concepts of Ch. Darwin and S. Freud, this article asserts and substantiates the special role of the human being in the history of nature. His qualitative difference from other animate creatures. Works of Ch. Darwin and S. Freud have virtually downgraded the status of human being to that of an organism. If Ch.Darwin writes directly about that: " … The Simiadæ then branched off into two great stems, the New World and Old World monkeys; and from the latter, at a remote period, Man… proceeded.… " [19, p.273], S.Freud, manipulating the notion of unconscious, is not able to explain why the human nature has animal origin: " … we have to distinguish two classes of instincts, one of which, the *sexual instincts* or Eros … . The second class of instincts was not so easy to point to … . On the basis of theoretical considerations, supported by biology, we put forward the hypothesis of a *death instinct*" … " [20, p. 73].

CONCLUSION

In fact, the human being, unlike all animate creatures, is able (thanks to his consciousness) to voluntarily create conditions for emergence of new forms thus overcoming the adaptive nature of animals… As the other creatures only passively (involuntarily) participate in the process of emergence of new forms, fully submitted to the element of external conditions: " … In nature (inorganic and organic) transformation of a possibility to a reality takes place in a spontaneous manner … " [21, p.271].

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Also, we have to note the most important fact which remains beyond the field of vision of those prone to reduce a human being: " … a human being as a subject (or, rather, a full-fledged human being) does not descend from the monkey; it is only his organic corporality which does. As a subject, the human being descends not only from and not so much from the monkey as from the entire Existence, from its universal definitions and their universal logic – dialectics … " [22, p.499].
Nevertheless, all of that does not mean that the human being controls probabilistic irreversible processes. Having his consciousness, he is only able to control the conditions of emergence thereof.

Afterword

Novelty of my sentence consists in understanding consciousness ***not as the external relation*** towards ***substantival world***, in as ***the internal relation*** in the most ***substantival world***.

It follows from this that the mechanism of construction by the man of forms of the own existence is necessary.

But first of all theoretical justification of the possibility of such mechanism is necessary.

The analysis of history of science shows that the individual man always received forms of the own existence from the outside as certain cognitive projection of the hyperform unavailable to individual construction existing out of and irrespective of it.

And only Aristotle's hylomorphizm gives the theoretical chance to the form to arise along with the man. But mechanism of the form origins at Aristotle are described foggy, not specifically and not clearly. Its essential refining is required.

Besides, Aristotle has two as if the points of view contradicting each other. On the one hand, the form is not capable to exist out of and irrespective of the body; on the other hand, the form is capable to exist out of and irrespective of the body.

For myself I draw conclusion that these both points of view absolutely correct, but they are characteristic of different stages of evolution.

Forms, inseparable from the body and ***inbuilt in reality of substrate*** of the body, are characteristic of organisms of plants and animals. And the "autonomous" forms which are not real and being ***in the relation towards reality of substrate*** of the body are characteristic of the man.

Such ***relation of ideal and real forms*** which arises along with emergence of the man ***and is reflexive consciousness***.

The consciousness represents ***Tätigkeit*** of the reflexion [***Tätigkeit*** (but not activity of the organism)], which purpose are ideal forms, and its result – real forms.

From this point of view, consciousness is the creative mechanism of creation of ideal forms which, in turn, act as determinants of real forms.

The man having consciousness is capable to create ideal forms as the new own opportunities, and then to determine them real forms of the own existence.

Such understanding of consciousness sets new tasks which require non-standard solutions.
But the understanding of consciousness as reflexive relation between ideal and real forms opens new opportunities for designing of technologies of creative education.

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Quantum Science, Evolution, Biofield and Consciousness-A Perspective

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Introduction:

David Hawkins, in his famous book 'Power Vs Force' writes, "Society constantly expands its effortss to correct effects instead of causes, which is one reason why the evolution of human consciousness proceeds so slowly.....Man is struck with his lack of knowledge about himself ,until he can learn to look beyond apparent causes. From the human record, we may note that answers never arise from identifying causes in the world. Instead, it is necessary to identify the condition that underlies ostensible causes and these conditions exist only within man's consciousness itself".[43].Wherever we start to examine human evolution , we end up looking up at the phenomenon of awareness and the nature of human consciousness. Success of the ascent on the ladder of consciousness depends on having a guru (teacher) or teachings to specifically guide and inspire the aspirant. The aspirant, then, will not despair over his inability to achieve the goal unaided. The master recognize that every individual hasa compass to direct him, which has unique setting for him. " The individual, with the master's guidance understands that chaos is only a limited perception. Everything is a part of the largerWhole; it is this evolution,innate to the overall field of consciousness that guarantees this evolution of mankind, and with it, all life".[44]

How this ascent in evolution comes about? It comes through unification of self with the Cosmic Consciousness. Dr.Karl G. Jung, the cult-figure in psychoanalysis, gives a fascinating portrait on the concept of *Purusha* (the Cosmic Being), in his lectures delivered in Zurich. "*Purusha* is the symbol that expresses the impersonal..It is also exceedingly objective..... As St.Paulexpressed , 'but it is not that the 'I' that lives: it is Chirst that liveth in me ',meaning that his life has become objective life, not his own life but life of the Greater One, the *Purusha*[45]. He further says, in the same vein "*Purusha* is first seen(realized) in *Anahata*,the essence of man .....then becomes visible (understandable)..... i.e the first inkling of being within your psychological or physical existence that is not yourself (ego) – a being in which you are contained, which is greater and more important than you.If you understand it right .....this recognition of the psychogenic factor is nearly the first recognition of the *Purusha* ; the thing that units them all and that express them all, either concept of the energy[46]

Quantum Science is called the science of present times.It has imparted a new perspectiveto biological evolution and bioscience, factoring study of mutation, which involves molecular transitions among quantum states. It visualises 'virtual' state, which is not non-real.Quantum Science posits that the order which has evolved in thebiosphere is not from chaos,but from 'actualization' of virtual states. The order has existed long before its actualization.

Quantum selection chooses the state involved in mutation and drives evolution in tandem with natural selection.Thus the centre of evolutionary activity is shifted from the material level to the level of quantum entities with the non-material and mind-like properties.Thus it appears that the quantum reality is related not only to physical properties but also to principles related to our minds.Dr.Lothar Schaffer states that the identical DNAs are not copies of one another but the repeated actualizations of the same quantum state, but the concept of descent changes its meaning[1].A study is attempted here to understand biological evolution in the light of Universal Consciousness, recent advances in Quantum Science and researches in the new area of Bio-field science and the profound observations in Indic philosophy on creation and evolution

Quantum Science-A new window:

Atthe foundation of things, elementary particles exist in a kind of realitythat is different from ordinary reality:they have rudimentary mind-like properties;they can exert instantaneous long-distance influences on each other and they can exist in in a kind of reality that is different than ordinary reality;, "Modern atomic theory", Heisenberg wrote, "is essentially different from that of antiquity in that it no longer allows any reinterpretation or elaboration to make it fit into a naïve materialistic concept of the universe. Newton's physics is materialism, i.e. the doctrine that "to be is to be material"[2]. Quantum physics has opened a window to a different kind of reality. Elementary particles are not real in the same way as the things they form. The three aspects of quantum physics can be highlighted as(1).The basis of the material world is non-material(2).Quantum systems can exert instantaneous, long distance influences on each other(3). Quantum systems have mind-like properties.

The wave properties of elementary particles are a manifestation of the wave-particle duality; when observed, elementary entities always appear as particles; when not observed, they act like waves. The nature of these waves is that of probability waves or probability fields, because they provide probabilities for finding an electron in space. Since probabilities are dimensionless numbers, probability waves are empty, (*sunya)*, carry no mass or energy, just information on numerical relations. Yet all visible order in the universe is determined by the rules of their interference. In contrast, quantum physics has opened a window to a different kind of reality. A crack

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has evolved in the materialist world of classicalphysics ,elementary particles are not real in the same way as the things that they form Fritjof Capra says "As we shift our attention from macroscopic objects to atoms and subatomic parcels, nature does not show us any isolated building-blocks, but rather appears a complexweb ofrelationship between the various parts of a Unified Whole"[3].

The wave-particle duality means that reality is created by two processes. In the first process, between observations, elementary entities constantly evolve into super-positions of possibilities or tendencies for actual events to occur. This is the wave-like state of reality. In the second process, the transition from the possible to the actual take place when an observation is made. One of the states contained in the super-positions of possibilities becomes the actual one. This is the particle-like state of reality. Heisenberg compared the super-positions of possibilities to Aristotelian potential. In super-position states, the quantum entities are not quite real, but have the potential of becoming real.

In contrast, in the quantum world, influences can act instantaneously over arbitrarily long distances. Experiments involving Bell's theorem have shown that, under certain conditions, decision made by an experimenter in one laboratory can have an instantaneous effect on the results of an experiment in another laboratory a long distance away. In experiments of this kind, two particles which at one time interact and then move away from one another are found to stay connected, as though they are one thing, no matter how far apart in space they are. This is the non-locality of the quantum world. Quantum non-locality implies a holographic universethat necessitates a holistic approach[6].

At the quantum level of Reality, the line of demarcation is blurred between realms of phenomena, which are characteristically disconnected at the level of consciousness, such as the Natural and the Supernatural. . At the foundations of physical reality, the nature of material things reveals itself as non-material. Deterministic process alternate with expressions of choices in creating the visible order. Entities with mind-like properties are found. Till Einstein, everybody thought 'absolute space' is the arena (mathematically, a 'manifold') on which things change with 'absolute time'. In special theory of relativity (STR), Einstein redefined the manifold to be flat space-time by making both space and time relative with respect to inertial observers but keeping space-time absolute. In general theory of relativity (GTR), he propounded this manifold to be curved space-time that can act on matter unlike the flat space-time. Then the Quantum Theory (QT) pointed-out this manifold to be an abstract mathematical space called Hilbert space, since the space-time description of quantum processes is not available. Quantum Field Theory (QFT) that originated in a successful merge of QT and STR requires this manifold to be the Quantum Vacuum (QV). Unlike the ordinary vacuum, QV contains infinite number of `virtual' particles that give rise to all matter and interactions.

With the advent of quantum mechanics,this seemingly contradictory differences between particle and wave lost their sharpness in the quantum world. The concept of symmetry (invariance) with its rigorous mathematicalformulation and generalization has guided us to know the most fundamental of physical laws. "One overarching lesson we have learnt in the last 50 years is that all forces are associated with nature's symmetry principles", as observed by Prof. Greene[6]. Forces exhibit their separate identity when nature's symmetry is spontaneously disturbed. Manifestation of one more symmetry of the laws of nature, known as super-symmetry, is indicated, even though circumstantially. Super-symmetry is surmised to facilitate unification of bosons and fermions at the Planckscale different aspects where the field behavesas just different aspects of one field, the super unified field.

According to QFT, the basic matter-fields interact by exchanging messenger fields (technically called gauge fields) that definne the most fundamental level of communication in nature. Both matter fields and gauge fields originate in the fluctuations of QV and in this sense everything in universe,, including consciousness is, in principle, reducible to QV and its fluctuations.

According to quantum theory, the quantum vacuum contains neither matter nor energy, but it does contain fluctuations, transitions between 'something' and 'nothing' in which potential existence can be transformed into real existence by the addition of energy. (Energy and matter are equivalent, since all matter ultimately consists of packets of energy). Thus, the vacuum's totally empty space is actually a seething turmoil of creation and annihilation, which to the ordinary world appears calm because the scale of fluctuations in the vacuum is tiny and the fluctuations tend to cancel each other out.

A solid scientific foundation supports the basic insight of quantum field theory that the primary elements of reality are the underlying fields, which permeate all space and time. Itis reasonable to assume that all these fields come from a common source. It is indicated in the very first verse of Isavasya Upanishad, which states that all the things, moving and non-moving are permeated by the Cosmic Consciousness (Isvara). At the very substratum of space, the Planck length, all the underlying, fluctuating quantum fields of nature are surmised to be unified today in a virtual quantum way, even in the absence of great heat, typical of the beginning of universe.

The quantum vacuum is different from the classical vacuum because it contains the fluctuations even after you have turned the field down to zero.The quantum theory asserts that a vacuum, even the most perfect vacuum devoid of any matter, is not really empty. Rather the quantum vacuum can be depicted as a sea of continuously appearing and disappearing (pairs of) particles that manifest themselves in the apparent jostling of particles that is quite distinct from their thermal motions. These particles are `virtual', as opposed to real, particles. At any given instant, the vacuum is full of such virtual pairs, which leave their signature behind, by affecting the energy levels of atoms.

Consciousness and Evolution: The viewpoints of scientists:

Consciousness, the window through which we eventually connect scientific knowledge is an integral part of the universal reality. "The

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principle argument is that thought-process and consciousness are the primary concepts, that our knowledge of our external world is the content of our consciousness and that consciousness, therefore, cannot be denied", as observed by Eugene Wigner[8]. Again, Prof. Wigner says "It will remain remarkable in whatever way our future concepts may develop – that the very study of external world led to the conclusion that the content of consciousness is an ultimate reality"[9]. Roger Penrose adds to this, "this is only the phenomenon of consciousness that can conjure a putative theoretical universe into actual existence"[11]Again in the emphatic words of Prof. Penrose, "A world-view which does not profoundly come to terms with the problem of conscious minds, can have no serious pretension of completeness. Consciousness is part of our universe, so any physical theory, which makes no proper place for it, falls fundamentally short of providing a genuine description of the worlds"[12].

Talking about biological evolution, Carl Woese, states that "To understand living systems in any deep sense, we must come to see them not materialistically as machines but a stable complex dynamic organization"[47].. 20th century biology treats the biological problems as different aspects of the problems of complex organization. Evolution represents its dynamic generative aspect; microbiology and morphogenesis represent its emergent material aspect.[48].. Later discovery of the universality of biochemistry to explain the doctrine of common descent and the recent discovery of HGT (Horizontal Gene Transfer) could offer an alternative explanation for the universality of biochemistry, which is recognized as a major part of the evolutionary dynamics. One cellular system in particular is specially informative regrading HGT and it is the 'translation apparatus'. The translation component is a mix of molecules, some of which are highly refractory to horizontal genetic displacement, which are relatively susceptible. "…A primitive loosely connected and highly modular primitive cellular organization would be subject to rampant HGT… Primitive counterparts of some of today's specific enzymes may have been only class specific. Cellular entries of this kind would not have stable genealogical records…. The world of primitive cells feels like a vast sea or field of cosmopolitan genes flowing into and out of the evolving cellular entities. Because of the high level of HGT, evolution at this stage could in essence be communal, not individual. The community of primitive evolving biological entities, which as well as the surrounding field of cosmopolitan genes participate in collective reticulate evolution."[49]
In his very remarkable book titled "Evolution: A View from the 21st Century", James Shapiro describes how cells like wireless routers militantly guard against copying errors. He describes how the genome is like an Operating System organizing information, clearing up fields, repairing damages, regulating activity, etc. Shapiro posits an alternative to both Creationism and Darwinism – a third way, emphasizing on the information capacities of the cell. He recounts how molecular geneticists showed a protozoan splitting its own DNA into 1 lakh pieces rearranging them to produce a new functional nucleus, adapted to its new environment. Shapiro gives the outlines of the new adaptive system of evolution thus:

1. "Natural Genetic Engineering" referring to the cell's innate ability to organize the genes in response to a maze of inputs. This is not a natural selection.
2. Horizontal Gene Transfer (HGT) – Cells exchanging segments of DNA to instantly gain new features.
3. Interspecies Hybridization
4. Symbiogenesis, where completely different organisms merge to form a new species.
5. Epigenesis: Switching genes on and off without altering the DNA sequence.
6. Whole genome duplication – DNA doubling to expand "Hard Drive" and make room for new features.

Talking about the harmonious Whole, Albert Einstein has clearly expressed his view on the cosmic unity, natural order and wholistic creation. He says, "I like to experience the universe as one harmonious whole. Every cell has life, matter too has life; it has energy solidified. Our bodies are like prisons and I look forward to be free but I do not speculate on what will happen to me. I live here and now." [50]

Sir ArthurEddington has emphatically declared "Universe is of the nature of a thought or sensation in a Universal Mind… to put the conclusion crudely, the stuff of the world is mind-stuff. As is often the way with the crude statement, I shall have to explain that by "Mind" I do not hear exactly mean mind and by "Stuff" I do not at all mean stuff. Still this is about as near as we can get to the idea in a simple phrase. The mind-stuff of the world is, of course something more general than our conscious minds; but we may think of its nature as not all together foreign to feelings in our consciousness.Having granted this, the mental activity of the part of the world constituting ourselves occasions no surprise[13]. As in Immanuel Kant's Ontology, there is the world of appearances and that of the things in themselves. All our understanding is of the appearance of things, not of the real things. Kant called the things in themselves Noumenon; it denotes 'mind-like', similar to quantum-like.

Von Neuman observes that most of QM effects occurring in the microcosm such as entangled minds and non-locality, do not readily apply to everyday experience[24]. Later, Kafatos, through his research on QM tried to bridge the microscopic and macroscopic domains. In the recent field of neuroquantology, the scientists invoke "quantum-like" processes in several life-processes and macroscopic physics, like brain dynamics[25]. Crassolde and his associates further observed: "quantum like" indicates that the principles of QM apply at all scales, not just the microscopic and as such, they provide fundamental insights into phenomena in fields such as biology, neuroscience and medicine and potentially extending to other areas like psychology and even anomalies, Psi phenomena where one might apply QM phenomena such entanglement and non-locality[26].

We can recall the theory of evolution by the French paleo-ontologist, Teilhardde Chardane, which shares with Quantum physics the view that reality is wholeness and the elements of Consciousness are active at all levels of reality. He posits that matter and consciousness are not "two substances" are "two different modes of existence", but two aspects of the same cosmic stuff[14].

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"Before on this planet, the physical-chemical conditions allow the birth of organic life, the universe was either not yet anything in itself, or it had already formed a nebula of consciousness"[15] If the singular point of convergence of matter, the biological evolution has revealed itself as an "expansion of consciousness"[16]. "Then it can be understood only as that point in which the universe, having reached the limits of centralization, meets another, even more unfathomable centre – a centre that exists out of itself. And it is this point that the question of God emerges for the science of evolution, God as driving force collection point and guarantor"[16]. The famed Prof. Stephen Hawking, while taking about the anthropic principle, which proposes that the physical constants of nature are precisely tailored in this universe for unfolding of consciousness, states that "many scientist dislike the Anthropic principle because it seems rather vague and does not appear to have much predictive power. But the Anthropic principle can be given a precise formulation and seems to be essential when dealing with origin of universe"[17]

Dr.Vinod Deskhmukh, who has done extensive researches in consciousness presents three aspects of consciousness.(1)Conscious Arousal(2)Conscious Awareness(3)conscious Attention.Conscious arousal requires the interplay between the brain stem reticular activity system and the cerebral hemispheres. It describes the degree to which an individual is aware and is able to interact with the environment. Conscious awareness indicates that the individual is not only alert but also is cognizant of self and surroundings –the awareness is global, multi modal but non-specific in terms of any particular sensory or cognitive modality. Conscious attention implies the ability to respond to the direct awareness to a specific time-placement and person[18].

Taking the discussion further, Dr.Deshmukh delineates the difference between the 'pre-conscious mind' and 'mindful presence'. 'Preconscious' is the level of psyche that contains thoughts, feelings and impulses not presently in awareness, but which can be easily called into consciousness. It is spontaneous, multi modal and non-sequential, pre symbolic and pre personal. It is the matrix of intentional conscious proceedings. Such activities implicated in creating the unity of conscious perceptions, supported by Gamma Band Activity (GBA) whereas mindful presence is a natural whole hearted presence. It is a way of being that allows one to hold everything in the field of awareness without judging it, 'The *SakshiBhava'* of *Vedanta*. What is important is not the attended object but the process of attending itself. It is being aware of ones' own awareness as elucidated by Sri Ramana Maharishi in his seminal work "Sat Darsanam"[18]. In the meditative experience of the Self, as indicated by the Maharishi, there is no fantasy or conditional pressure, but an unconditional bliss. It starts with the emptying of all cognitive contents and an all-inclusive '*Poornatva'* dawns.

Dr.Deshmukh mentions about the two models of attention – the memory based sequential and vector-like mnemonic mode and the existential self-awareness or 'presence mode'. "Presence" refers to being presence minded as beautifully explained in the famous book "Power of Now" by Eckhart Tolle. It is being fully aware and cognizant of Self and the entire surroundings. It is a non-directed, pre-reflexive, first person experience in the primeval blissful feeling of being in existence now wholeheartedly. It implies freedom from cognitive ruminations of the past and anticipation of the future. Although there are many similarities between presence and mindfulness, the content of presence goes beyond the disciplines of mindfulness. Of course, mindfulness can lead to the state of whole hearted presence[20]. It is to be emphasized that this process is one of direct intuitive knowing by actually being, not by interactive dualistic observation. It is heightened awareness, leading to intuitive knowledge of the Absolute. It is being "timeless-in-time", the spontaneous '*AtmaSphurana'*, (the flowering of the Self). "What is important in mindful presence is not the object attended to but the process of attending itself". One can learn to be aware of oneself, which is the essential Self Awareness [21]

SaintGnaneshwar beautifully describes the unity-experience of the primal energy (awareness) and indescribable feeling of spontaneous unity, a non-cognitive, non-interactive and holistic unity thus in a sparkling sentence 'In that way we dissolve into the indivisible, homogenous Supreme'[22]

We can recall Sri Ramana Maharishi's beautiful statement in *Aksharamanamaala.* "Like the hailstone, formed of water, dissolves back in water as water,dissolve me in Thy form as boundless love,O Lord Arunachala , and thus Show Thy Grace"[19]

Bio-field Hypothesis and Evolution

The next jump in scientific progress is to the hitherto partially explored Bio-field hypothesis, and its relationship to Quantum Mechanics.From being mere hypothesis it has now evolved as ascience in its own rightsfor the existence for which enough evidence has been found. It involves several areas like EMF coherent states, bio-photons and ultimately the quantum vacuum. An informed study of the bio-field, its source and its relation to biology could lead us to integrated understanding of the consciousness and living universe. Several scientists have contributed to the study of bio-field. We can call or our reference, interlaid, the seminal article authored by a group of six eminent scientists from different areas on this subject. Prof. Menes C.Kafatos of Chapman University, Dr. G.Chavalier of the Earthing Institute , Dr.Deepak Chopra of University of California, Mr.Hebacher of Pantheon Research Inc. Dr.SubashKak of Oklahoma University and Dr.Theise of Mount SinaBeth IsraelMedical Center The article "*Bio-field Science:Current Physics Perspective* as cited in Global Adv. Health Med. epitomizes the research findings in bio-field science.

Preliminary research for phantom leaf effects can provide model systems for bio-field research as shown by Sudachar in his research[27]. It is necessary to do further researches in the physical origin of the bio-field and how it relates to an integrated understanding of consciousness and the living universe. It is imperative because of its relevance and immediate impact on human beings. Natural forces invisibly affect us every day and science has long searched for a ridge to connectthe quantum and physical worlds. The world turns out to be united in a very practical way through the phenomenon of life itself, the bio-field will be far more than theoretical. It will redefine what human life constitutes, where we belong in the panoply of life on the

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planet and ultimately how we should live in a wider, even cosmic context[28].

The emerging concept of Bio-field refers to that part of a living organism's energy getting integrated into a sort of an all-inclusive long range and toa certain degree coherent field[29].Integrative Biophysics indicates a departure from equilibrium thermodynamics which is the foundation of classical physics and chemistry; instead modeled of the organism, built completely upon the field concepts. As Popp observed, QuantumMechanicshas established the primacy of the inseparablewhole[30].For this reason, the basis of the new biophysics must be the insight into the fundamental interconnectedness within the organism as well as between organisms, and that of the organisms with the environment. This will be an integral biophysics. The existence of a pre-physical, unobservable domain of potentiality in quantum theory which forms the basis of the fundamental interconnectedness and wholeness of reality and from which arise the patterns of the material world may provide a new model of understanding the holistic features of organizations, such as morphogenesis and regeneration, and then provide a foundation for integral biophysics. Classical biologists have been following reductionist approach and genetics is considered as the sole discipline for explaining evolution. Authors like Kafatos advocate that biology and biophysics and their associates like EMFs, bio-photons and quantum interaction become the fundamental and complimentary aspects.

Quantum physics seeks to explain the existence of the bio-field and how it interacts with the body. Bischoff avers that "quantum physics has implicitly replaced the old reductionist and molecular view of science with a holistic one in which materialistic forms are unbroken whole".[32] Kafatos refers to Von Neuman's nondeterministic interpretation which presents a psychological component to reality itself. It depicts the observer in the role of an active participant in the creation of events. This view point, that the observer's participation plays an important role in the outcome of events, has fundamental implications for bio-field science and mind-body."All the features of unbroken wholeness of reality implicit in quantum theory – non-separability, non-locality, fundamental correctness – which are so fundamental for biological understanding are an expression of the properties of vacuum."[31]

What makes bio-field research so fascinating is its immediate impact on human beings. We are living entities embedded in the fields described by classical and quantum physics. Natural forces invisibly affect us every day, and sciencehas long searched for abridge between the quantum and classical worlds. If these worlds turn out to be united in a very practical way through the phenomenon of life itself, the bio-field will be far more than theoretical. It will redefine what human life constitutes, where we belong in thepanoply of life on the planet, and ultimately how we should live in a wider, even cosmic context[33]

The bio-filed hypothesis is now beginning to be accepted as thefield that can be scientifically evaluated. Scientists aver that the properties of such a field could be based on electromagnetic fields, coherent state bio-photons, quantum-like processes and ultimately the quantum vacuum(QV)[34].The learned authors delineate bio-field science thus: conventional biology is based on molecular processes i.e. biochemical interactions that ultimately reduce to macromolecules such as DNA and RNA. Organizational biology which relies on the reductionist approach of understanding the whole by analyzing how the parts fit together. These approaches fail to address phenomena that by their nature are holistic i.e. they may need to be explained from a whole organism-context, crossing boundaries of scale and thereby including quantum and conventional fields, mind and relationship to environment[35]. Bio-field is defined as an organizing principle for the dynamic information flow thatregulates biological function and homeostasis.Bio-field interaction that can organize spatio-temporal biological processesacross hierarchical levels from the sub-atomic, atomic, molecular, cellular, organismicto the interpersonal and cosmic levels.

As such, bio-field interactions can influence a variety of biological pathways including biochemical, neurological and cellular processes related to electromagnetism, correlated quantum information flow and perhaps other means for modulating activity and information flow across hierarchical levels of biology. This indicates a unique role for quantum models thus treating biology as an extension of quantum physics. As observed by Kafatos and his associates, the generic science of biology is complimentary to the generic science of physics (i.e. the two are closely related but not identical)and possibly both are anchoredto mutual processes through the underlying quantum vacuum [31].

Under conditions, where dilute gas of bosons cooled to temperatures approaching absolute zero called Bose-Einstiencondensate, microscopic quantum phenomena manifest and are hypothesized as qualities of bio-field, as the endogenous EMFs coming from bio-photonics. Bischoffsummarizes the findings as "All living organisms including humans emit a low intensity glow that cannot be seen by the naked eye, but can be measured by photomultipliers that amplify the week signals several million times and enable the researchers to register it in the form of a diagram. As long as they live, cells and whole organisms give off a pulsating glow with a mean intensity upto a few thousand photons per second and square centimeters, also known as 'cellular glow' or 'ultra-weak bio luminescence'[32]. The collective bio-field consists of at least electromagnetic, optical and non-classical energy fields associated with biological entities, cells, bodies, ecosystem and even Gaia as a whole[38]. Thus bio-fieldhas great relevance to medical therapy and healing areas. They reflect the influence of mind/body interactions. The role of the observer in quantum mechanism like *Sakshi* in *Vedanta* is given primary place in understanding the mind/body complex.

Professor Heisenbergsays that in the relativistic quantum theory, solutions to the Dirac equations confirmed the existence of scalar waves as the primary aspects of biofield[2]. The researches in non-classical fields led the scientists to regard the body as a macroscopic quantum system[39]This has led to an integrated quantum description of the body where bio information plays a vital role. The implications

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are profound. It could lead to profound insights into therapy, morphology, disease elimination, mind/body complex and the very foundation of evolution and the aspects of consciousness, properly delineating the interface between biochemical/mechanical world and quantum vacuum. It could emerge as the key to integrated biology, leading to what Archibald wheeler refers to as'participatory universe'. Quantum theory presents us with a world following a different order from the world of every day experienceManyof the founders of Quantum Theory understood the significance of Wholeness in physics and biology. Schrodinger wrote a great book titled "What is life?" in which he approached the holistic view of both Quantum Mechanics and life as similar [40]. Max Planck held that wholeness must be introduced in physics as in Biology[42].Bohr talks about the significanceof complementarity beyond QM and its importance to biology.

Very recently, Dr.Lanza, in his book, *Biocentrism: How life and Consciousness are the keys to understand the True Nature of the Universe*" is looking at the universe from a bio-centric point of view. He posits that Space and Time are tools of our mind. His theory that Space and Time are meremental contacts is yet to be tested and accepted.

Consciousness and Evolution-Indian philosophic perception

Dr. Paul Deussengives an extensive review of the *Vedic* literature and says "The motive of the conception that dominates all these passages may be described to be the recognition of the first principle of the universe as embodied in nature is a whole, but especially and most of all in the soul (the universal and the individual). Hence the idea arose that the primeval being created the universe, and then as the first born of the creation entered into it"[4]. The world is because of the individual consciousness 'I am' there to observe it. Paul Dirac also confirms: "At this stage it becomes important to remember that science is concerned only with observable things and that we can observe an object only by letting it interact with some outside influence "[5].

A great conceptual step taken by Indian Philosophy in this regard is to introduce a fourth state of mind called *'turiya'* that is defined to be none of the above but a combination of all of the above states. This state is claimed to be the super-conscious state where one transcends the limitations of perceptions constrained by space-time. *Patanjali* has provided very scientific and step-by-step instructions to reach this fourth state through *samyama, dharana, dhyana* and *Samadhi* are different levels of *samyama*. Sometimes the possibility of having a universal language (like *Sandhyabhasa* etc.) to communicate with everything in the universe is also mentioned. Modern physics tells us that the only universal language is at the level of gauge bosons and QV. Is there any connection between these two? Can a (human) mind be trained to transmit and receive at the level of QV?

Indian philosophic tradition,right from Vedic times , is rich inits profound insight into the field of evolution and consciousness.Revered saints,fromSankara onwards, and scholars have presented a veritable rainbow of philosophic viewpoints inthis arena.,Sankara's concept of evolution is '*Brahma-vivarta-vada'*(theory of apparent changes); it takes the world to be only a phenomenal appearance of *Brahman*. He is opposed *to Brahma – Parinama-Vada*: (transformation of the Absolute.) He says that the world is neither a real creation by the Cosmic Consciousness (*Brahman*) nor a real modification of *Brahman;Maya* or Nescience is the ground on which the phenomenal world is super-imposed. When the essential identity of *Jiva* with the *Paramatama* is realized, the world is sublated. For Sankara, *Brahman* is both the material and efficient cause of creation. He avers that *Parinamavada* (Theory of transformation or evolution) is illogical. He rejects the idea that the cause for creation and evolution is the unintelligent *prakrti.* How can the immanent teleology in nature be explained by unintelligent *Prakriti* (primal nature) ? Hence Sankara says that the intelligent *Brahman*can only the such a cause. Only the Conscious *Brahman* associated with its *Maya Sakthi*(the limiting power of the Infinite) can be the creator , preserver and destroyer in the world. For him, from the phenomenal point of view, the world is quite real, so long as the true knowledge does not dawn. *Avidya*or Primordial ignorance conceals the essential unity of soul and the Absolute and projects name and form. The *ParaBrahman* or the Absolute is both the locus *(Ashraya)* and the object (*Vishaya)* of*Maya.*

As against Sankara*Vedanta* which advocates Advaitic (non-dual) stand point, ShriRamanuja, strongly posits *Vishitadvaita* (qualified non-dualism) view. According to Ramanuja, all knowledge involves distinction and there is no un-differentiated pure consciousness. Agreeing with Hegel, in his criticism of metaphysics, Ramanujaposits that both pure identity and pure difference are alike unreal. He says that Sankara's view is erroneous in this regard. *Brahman* or the Absolute cannot be indeterminate, undifferentiated quality-less substance. Self is distinct from knowledge. It is a self-luminous substance possessing *Dharma- Bhuta – Jnana* (attributive consciousness) as the essential attribute. Self is not pure consciousness but only the eternal substratum of consciousness. All individual souls are pervaded by God and form his body. They are atomic and become God-like in liberation God or Vishnu is immanent in all (*Antaryami)* and yet in essence, He transcends the creation. Matter and souls are attributes or modes *(Prakaraki*). Ramanuja says that true *upasana* (meditation) or *Dhruvabhakthi(permanent devotion)* is obtained by *Prapatti*(self-surrender).It is the true means for realization. The intuitive knowledge of God, facilitated through *Prapatti* dawns only by His Grace (*Prasada)*.Ramanujaposits that the views like *Bheda* (difference*), Abheda (*non-difference) and *Bheda- abhedaa* (identity-and- difference) are erroneous. He propounds the theory of '*aprtak–siddhi'* or 'inseparable difference' , indicating a unique relationship between God and soul. Creation or evolution is only an explicit manifestation of the effect inherent in material cause. Ramanjua believes in '*Parinamavada*' (evolutionary transformation), which means that the material cause really changes itself in the form of its effect, like gold ornament is of gold.

Madhvacharaya, the determined foe of Sankara*vedanta,* posits that God, soul and matter are the three entities which are eternal ,absolutely real,and absolutely dependent on God. God alone is independent. In this aspect ,he agrees with Ramanuja. However,

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Madhvacharya is a rank-dualist and does not believe in 'qualified absolutism ' ofRamanuja. According to Ramanjua ,differences have no separate existence ;they belong to the identity which they qualify. But for Madhvacharya, differences have separate existences and constitute the unique nature of things. He rejects the relation of inseparability (*Aparthaksiddhi*) and the distinction between substance and non-substance. Matter and soul are different from God and from each other. They cannot form His body. While Ramanuja advocates qualitative monism and quantitative pluralism, Madhvacharya says that no two souls can be alike. He avers that God is only the efficient cause of the world and its material cause is Prakrti, unlike Ramauja's stated position that God is both the efficient and material cause of creation and evolution. Madhvacharya also emphasises essential difference between God and liberated souls and says that the liberated souls cannot be 'God-like' .

The renowned saint from the Vaishnavitetradition ,Nimbarkaproponded the '*Dvaitadvaiatavaida*' or '*Bheda-abhedaa'* tradition. He also, like Ramanuja admits three realities- God, soul and matter, the later two being dependent on that. The individual soul is essentially of the nature of '*JnanaSwarupa'* (knowledge). It is also the substratum of knowledge, the relation between the subtentive and the attributive is that of the relation between the qualified and qualification (*Dharmi-Dharma-Bhava*). Liberation of soul , which is atomic in nature , is due to knowledge which is brought about by God's Grace, which again is due to the dedicated devotion by the aspirant. God is identified with Krishna, Radha being His consort. Soul and matter are His parts in the sense that they are His powers. He is both the efficient and material cause of creation. Creation is the real Parinama (transformation) of his powers. While Ramanuja posits the idea of 'identity-qualified-by difference', Nimbarka believes in 'identity- and – difference'. For him, both are equally real. He also rejects the view that matter and souls are attributes of God and the distinction between the body and soul of God, as also the view of Ramanuja that the matter of soul form the body of God. He terms matter and soul as the 'parts' or 'powers of God'

The view of Sri Vallabhacharya on creation or evolution is neither *Vivarta*nor *Parinama*. It is in between the two and is called '*AvikrtaParinamaVada'*. For him, the universe is not a *Vivarta* (transfiguration) for it is a real manifestation. But it is not also a *Parinama* (Evolution) for this manifestation does not involve any change or transformation. It is a natural emanation from God which does not involve any notion of change and is therefore called '*AvikrtaParinama'* .Vallabhacharya says that the cause and its effects, the substance and its attributes are identical. In the place of *Updana Karana* (material cause), Vallabhacharya uses the expression '*Samavayi Karana'* (Inherent Cause), because the material cause is identical with its effect and does not involve, as far as *Brahman* is concerned, any notion of change. *Brahman,* thus, is the inherent cause as well as the efficient cause of creation. Creation means manifestation of God as the Universe in diverse forms without undergoing any change. From Him, nature as existence (*Sat*) springs forth life,bodies etc., which act as elements of bondage;; from His nature as knowledge (chit) springs forth the atomic souls which get bound. From His nature as Bliss, springs forth *Antaryamis*, as many as the souls in number, who are the presiding deities of the souls.God is the Supreme *antaryami.*

The supreme saint from Bengal, Sri ChaitanyaMahaprabhu,posits the '*AchintyaBheda-Abheda'*theory (identity-in-difference), the nature of which is essentially indescribable. Brahman or Sri Krishna is essentially *Sacchidananda* and is the auspicious abode of infinite supreme qualities and powers. The attributes are identical with the substance though they may appear differently. Sri Krishna manifests Himself, through his powers, as the world and the souls which are identical yet different from Him. He Himself is the efficient and material cause of the universe. His powers, which form His essence are called "*AntarangaSwarupa Shakti*" and manifest as His threefold powers – *Sandhini*(Existence), Samvit*(Knowledge*) and *Hladini* (Bliss). He manifests Himself as atomic souls through Jeeva Shakti (life power). He manifests Himself as the world through Maya Shakti. Bhakti is the sole means of liberation which is of two types – Vidhi Bhakti (through the study of religious texts and Vedas) and Ruchi or Raganuga Bhakti, which is the intense spiritual love for God like that of Gopis and which culminates in the love of Radha. This Ruchi Bhakti is the highest form which leads to liberation.

The *Saivite* school of *SaivaSiddhanta* also calls itself as "Suddhadvaita", the name which Vallbhacharya's school of *Vaishnavism* bears. But where Vallabha means by '*Suddha'*as something which is free from impurities of*Maya*, and by *'Advaita* 'non-dual *Brahman, SaivaSiddhanta* uses the word '*Suddha'* to mean 'unqualified' and the word '*Advaita'* in the sense of '*Dvaita-devoid-of-duality'*, which means that difference is existent but inseparable from identity and consciousness.

To Conclude:

The field is vast. It needs an enlightened and unbiased approach to comprehend evolution from the primal cause ,as the manifestation of the Ultimate Truth or the Absolute.

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Talk 9: (Hall 1)

Health Benefits Of Vegetarian and Vegan Diet including Spirituality

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I noticed my high blood pressure in 1996 when I had to donate blood to my wife and in that time it was recorded to be 220/110. Later I checked in 2000, it was again 220/120, then I went to the clinic of physician consultant of Bir Hospital Dr. Madhur Dev Bhattarai, he prescribed the amlod medicine to control pressure, then I took that medicine for three months but this medicine made no difference to my blood pressure hence I did not continue the medicine rather I left eating meat and fish and became vegetarian. In 2006, I went to Universiti Putra Malaysia of Malaysia to study PhD. During that period also my blood pressure was recorded as usual 220/120. I completed PhD in 2010 June and came back to Nepal, As the

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pressure was remaining as before then I thought dairy products may be the cause for high blood pressure. Then, I left eating dairy products as well and became vegan totally. Nevertheless my pressure is still as usual 220/110. On the other hand all records that examined medically such as ECG, lipid profile, and rest of tests, all of my physiological activity appeared to be normal every time. In my part, I always walked one and half an hour and devoted about one hour for spiritual practices from the time I noticed my high blood pressure. During the nineteen years period of time (1997- 2016), I adopted serious fasting i.e. without any food and water from Thursday evening to Friday evening (24 hours) starting from 5 PM to next day 5 PM. I have about seventeen years of my experience and practice of becoming vegetarian and vegan including spiritual practices, I have been experiencing a normal life with all physiological parameter intact.

From our modern medical literature we know high blood pressure kills half of the population of the world. Had I not cared about the food pattern and continued eating meat, fish and animal products and had I not adopted spiritual practices with confidence, it might not have been possible to maintain blood pressure whatever I have been experiencing now. We also know more Americans are dying from high blood pressure today than a decade ago. The prevalence of high blood pressure - the main killer of world population - continues to climb, with about 41% in U.S. [1] – which must be because of excessive eating of animal based diet. Nevertheless, my experience says adoption a vegetarian or vegan life style with spirituality will definitely protect from such devastation of human health. It seems - what medical science or general science says are becoming abnormal in metaphysical science and what metaphysical sciences says are becoming abnormal to the science – although the truth may be penetrating in both domains.

Let us see some literature and scientific finding that compared effect of vegetarian or vegan diet versus omnivorous or non veg diet in human health parameters.[2] From the published research, Fraser[3] found that vegans are thinner with lower total cholesteroles and LDL and modestly lower blood pressure. From the findings, in all races including whites worked by Toohey et. al., showed that blood lipids and body mass index (BMI; in kg/m^2) were significantly lower in African American vegans than in lacto-ovo-vegetarians.[4] Among Latin Americans, vegetarians had lower plasma lipids than did their omnivore counterparts, with the lowest reported among vegans[5]. From the study, it was found that plasma total and LDL cholesterol were 32% and 44% lower among vegans than among omnivores. Research has consistently shown that vegetarians, and particularly vegans, are leaner than their omnivorous counterparts[6]. The European Prospective Investigation in Cancer and Nutrition (EPIC) Oxford study compared weight gain over 5 years in almost 22 000 meat-eating, fish-eating, vegetarian, and vegan men and women[7]. Weight gain was lowest in the vegan group and those who, during follow-up, had changed to a diet containing fewer animal foods. The same study reported a significant difference in age-adjusted BMI between the 4 diet groups, with meat eaters having the highest BMI (24.41 kg/m^2 in men, 23.52 kg/m^2 in women), vegans the lowest BMI (22.49 kg/m^2 in men, 21.98 kg/m^2 in women), and fish eaters and vegetarians a similar, intermediate mean BMI[8].

The most consistent evidence for the health benefits of a vegetarian diet relates to a reduced risk of coronary heart disease (CHD) and coronary disease mortality. Several studies have demonstrated a lower incidence of CHD[9] and a combined analysis of 5 prospective studies reported a 24% lower risk of mortality from ischemic heart disease (IHD) in vegetarians compared with meat eaters, with lactoovo vegetarians having a 34% reduced risk and vegans a 26% reduced risk. Specific aspects of a vegetarian diet, including a lower intake of saturated fat, higher intake of soluble fiber, and increased consumption of whole grains, legumes, nuts, and soy protein, are likely to contribute to its cardiovascular benefits[10]. Hypertension evidence suggests that a vegetarian diet may help in both the prevention and management of hypertension[11]. Compared with nonvegetarians, vegans were 75% less likely to be treated for hypertension, lacto-ovo vegetarians 65% less likely, pesco-vegetarians 38% less likely, and semivegetarians 23% less likely. A number of randomized clinical trials have shown that a vegetarian diet can lower blood pressure in both normotensive and hypertensive individuals[12]. These findings are consistent with the results of the DASH (Dietary Approaches to Stopping Hypertension) trial, which found that a diet high in fruit, vegetables, whole grains, and low-fat dairy products significantly reduced blood pressure in those with normal blood pressure or mild hypertension[13].

If we evaluate it in the modern human civilization prospects, the development of science has progressed beyond the imagination in the subjects of basic sciences, medicines and literature in the nineteenth century. In between 1901 and 2015 A.D, the Nobel Prizes were awarded 573 times to 900 people and organizations including 822 men, 48 women and 30 organizations in the field of physics, chemistry, physiological medicine, economics, peace and literature. Among them, ten Nobel laureates; Marie curie(physics, 1903, and chemistry, 1911), Robert Koch **(physiology, 1905), Max Planck** (physics, 1918), Albert Einstein (physics, 1921), Enrico Fermi (physics, 1938), Otto Hahn (chemistry, 1944), Linus Pauling (chemistry, 1954, and peace, 1962), Ernest Hemingway (literature, 1954), Norman Borlaug (piece, 1970), Ronald Coase(economics, 1991)[14] changed the world. Although scientists have been able to find many of the materialistic discoveries however they are failing to address the paranormal phenomena of which occurrence is frequent everywhere and every time. Now time has come to tilt our focus in the metaphysical issues as well to

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make it complete science, especially following the track of eastern wisdom particularly that of Vedantic philosophy.

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Talk 9: (Hall 2)

Study of consciousness in the light of Vedanta

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Introduction

Vedic science is the system that is generally consciousness based, consciousness centric and consciousness aimed. This includes the Vedic wisdom followed by *Pürvamimäsä, Vedänta, Sänkhya, Yoga, Nyäya* and *Vaisesekeñika*. Vedic science is the holistic science which covers not only physical but also spiritual aspects of life and universe. Vedanta represents the final teachings of the Veda, originally Vedanta meant the Upanishads.

Modern science leaves no room for the subjective aspect of consciousness in its attempt to know world as the relationships among forces, atoms, and molecules. This mechanistic approach created the duality between the experience and the experiencer – "easy problems" and the "hard problem" of consciousness. [1]

Whereas Vedic science deals with two kinds of knowledge: *Våttijïänam* and *SvarÛpa jïänam*. *Våttijïänam* indicates the knowledge which is in the form of mental mode. Mostly material scientists deal with this only in the name of consciousness. Though Yogic science accepts this, it goes beyond this and deals with *SvarÛpa jïänam* which means the knowledge that is the core nature of the self. [2] The first one *Våttijïänam* is some how discussed by material science; but the second is totally missing in material science and it is beyond the material understanding.

Thus Yogic view of consciousness is holistic in nature – it deals consciousness with its different layers, i.e. from known to unknown, from gross to subtler, from infinity to one, from seen to unseen, from the knowledge which is in the form of mental mode to the knowledge that is the core nature of the self and from physical consciousness to spiritual consciousness. These are clearly explained in *UpaniṢhads*.

Background

Since the last few decades, consciousness has emerged as an important field of study for scientists. There is a growing interest to investigate consciousness among quantum physicists, neurophysiologists, and biologist. Though many of the modern scientists hold the idea that all mental processes are biological,[3] their unfailing urge in the study of consciousness seems to indicate that they are consciously or unconsciously not satisfied with their matter based approach of nature.

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Though the matter based approach is verily needed to achieve quantification and measurement and to avoid the prejudiced and wrong speculations related to the immeasurable metaphysics, featured with superstition, it cannot take a scientist to what is called as the core purpose of life by the Vedas, i.e. liberation or complete peace. It is neither holistic.

The great seers of Vedic age realize consciousness through higher meditative aloofness (by the self experience) not only by discussions and debates. And they conclude that the core consciousness is of experiential knowledge which cannot be experimented with material equipments. The scientists feel a need of the deep study of consciousness. The ancient Vedic wisdom may satisfy their urge.

Aims and objectives

This article just throws a light on how consciousness is dealt in Vedic sciences. The main objectives of this article are as follows:

i. Investigating Vedic means from the selected upanisads.
ii. To extract the Vedic meditation techniques (*Upāsanās/Dhyānas*) and how it practically apply for mystic experience of pure consciousness.

Consciousness in Vedanta

Actually the whole Vedic philosophy is based on consciousness principle and the whole Vedānta mainly deals with this ultimate reality or the pure consciousness. Consciousness as a part or aspect of mind is a superficial understanding according to Chandogya Upanisad - ***annamayaṁ manaḥ.*** Mind is made of matter. But consciousness is not material.[4] Vedic philosophical thought goes to the extent of regarding pure consciousness to be the "all pervasive reality, present in everything-living beings and nonliving object, constituting their core." ***Sarvaà khalvidam brahma*** Everything is Brahman (or pure consciousness). [5] Moreover kathoupanisad said - ***Yena rūpa rasa gandha sabdān sparçāðçca maithunān, Etenaiva vijānāti kimatra pariçiñyate etadvai tat*** "Consciousness is that by which the form, taste, smell, touch and all, are recognized."[6] Thus consciousness is absolute awareness (witnessing faculty) behind the sense-awareness. ***anyatra dharmādanyatrādharmādanyatrāsmātkåtākåtāt.***

anyatra bhütäcca bhavyäcca yattatpaçyasi tadvada. Tell me that which is beyond righteousness and wrong, done and not done and past and future. [7] Therefore consciousness is that which is beyond time and causation that is eternal reality.

yenāśrutaṁ śrutaṁ bhavatyamataṁ matamavijñātamaṁ jñātamamiti . By which the unheard becomes heard, the unthought becomes thought. That is the knowledge of every thing and that is pure consciousness. [8] ***ekena sarvaṁ vijñātaṁ syādvacārambhaṇaṁ vikaro nāmadheyaṁ ekameva satyam*** By knowing that one, everything is known. All other things are mere transactional realities. Consciousness alone is the absolute reality.[9] Thus consciousness is the science of everything. ***sanmūlāḥ imāḥ sarvāḥ prajāḥ sadāyatanāḥ satpratiṣṭhāḥ.*** All these beings are born from that absolute reality (pure consciousness) and based on it. [10] Thus pure consciousness is absolute; all other things are its products.

Manifestation of consciousness: Vedantic paradigm

Indriyebhyaù parā hyarthā arthebhyasca paraà manah . Manasastu parā buddhirbuddherātmā mahānparaù . Mahataù paramavyaktamavyaktātpuruñaù paraù | Puruñānna paraà kiïcitsä käñöhä sä parä gatiù. Sense objects are higher than the senses. Mind is higher than the sense objects. Intellect is higher than the mind. Mahat is greater than the intellect. Unmanifest is greater than Mahat. Pure consciousness is greater than unmanifest. There is nothing higher than the pure consciousness. It is the culmination.[11] Consciousness manifests through the faculties like sense objects, senses, mind, intellect, *Mahat* and unmanifest. This concept of manifestation is totally reversible with comparison to modern sc ience. This is graphically represented in the picture below.

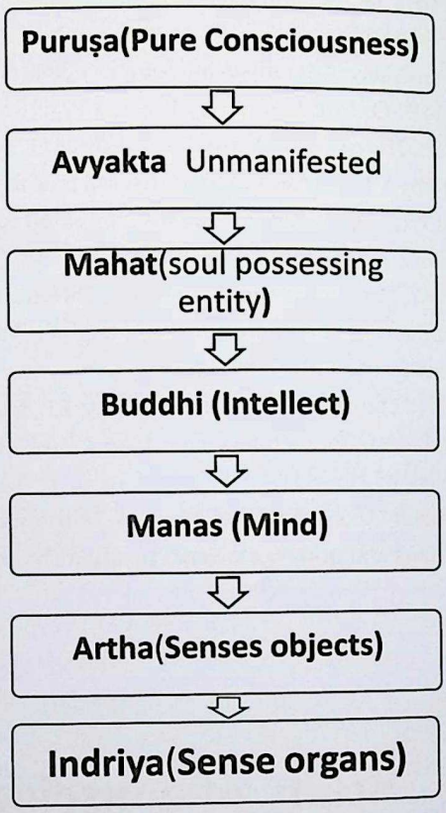

Fig. 3 -Manifestation of consciousness according to vedant science.

Vedic means to study consciousness

Consciousness is not an object; but a subject. Therefore it cannot be measured by any scientific device or observations since it is beyond the relativities. It can be realized only with the consistent self awareness. The self itself is the means of knowledge for the self. The self is self-evident. The Vedas and Upaniñats are valid mean of consciousness as they are the revelations received by the seers in the deep meditation. Thus scriptures are taken for means. It is well known that any evidence is valid in its own fields of function. Eyes are valid in the fields of color and form. Ears are valid in the field of sound. Like wise vedas are valid in its field that is beyond the sense percption and mental cogination.

Even the importances of the Āgama (vedic scriptures) are also accepted by the great scientist of modern science, Nobel physicist Schrodinger, writing on the growing importance of consciousness in the plural. This is simply something we construct because of the temporal plurality of the individuals. But it is a false construction ……the only solution to this conflict, in so far as any is available to us at all, lies in the ancient wisdom of the Upanishads.[12]

Although *Āgama* is highly authentic and valid means of knowledge, it has limitations – in the sense *Āgama* is not the ultimate. Mere reading, memorizing, and intellectually understanding the Vedic text is not sufficient

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for realizing the absolute consciousness. *Upaniñat* insists more on meditation of the self, than mere scholarship of scriptures.

The verses of Katha and Chandogya Upanisad, that talk on realization of consciousness are discussed below. ***yacchedvāimanasé prāji̇astadyacchejji̇āna ātmani jñānamātmani mahati niyacchettadyacchecchānta ātmani .*** Let the wise sink his speech in to the mind,the mind into the Intellect and the intellect into the Mahat and Mahat into the peaceful soul. [13] ***uttiñöhata jägrata präpya varānnibodhata . kñurasya dhärä niçitä duratyay durgaà pathastatkavayo vadanti .*** Arise, awake, having reached the great(teachers), learn (realise that consciousness). Like the sharp edge of a razor is that path, difficult to cross and hard to walk—thus the wise say.[14] The self-existent Brahman created the senses with out-going tendencies; therefore man beholds the external universe and not the internal Self. But, some wise man with eyes averted from sensual objects(with his senses turned away), aspiring Immortality, sees the self with in.[15]

Methods to attain Consciousness -*Upāsanas* (Meditations)

According to Vedänta the Avidyä (ignorance) is beginningless and powerful, therefore it can be removed only through the self-realization and the self – realization cannot be attained by the mere study of vedäntaväkyas. Therefore besides the study of the *Vedäntaväkyas, Dhyäna* and *Upäsanäs* have been prescribed by the *Vedänta* themselves, which can be practiced with strong aspiration for attaining absolute truth. All the *UpaniṢads* recommended *Upāsanas* or mediation, as a method to realize consciousness.

Sankaracharya defines *Upāsana* or meditation as a process of unwavering application of the same thought on some object prescribed by the scriptures, without being interrupted by any alien thought. Rämänujacharya defines it as: *'dhyänam ca tailadhärävat avicchinna småtisantäna rupa,'* continuous flow of remembrance like the stream of continuously dripping of oil.

'Dhruva smṛtiḥ smṛtilambhe sarvagranthināṁ vipramokṣaḥ'.when the constant, (*Dhruva*) remembrance, (*smṛtiḥ*) is attained all knots vanish.[16] Thus *Dhruva smṛtiḥ* is prescribed as the means of liberation. Here remembering is synonymous with seeing.

Meditation and reflection imply a repetition of the mental act. When we say "He meditates on it" the continuity of the act of remembrance of the object is implied. Similar is the case with reflection also. From this it follows that repetition has to be practiced there also, where the text gives instruction once only. Where, again, the text gives repeated instruction, repeated performance of the mental acts is directly intimated. 'knowledge' implies repetition and meditation.

In the Vedänta texts the terms 'knowing' and 'meditating' are seen to be used one in the place of the other. In some passages the term 'knowing' is used in the beginning and the term 'meditating' in the end: thus, e.g., "He who knows what he knows is thus spoken of by me" and "teach me sir, the deity which you meditate on". [17] In other places the text at first speaks of 'meditating' and later on of 'knowing'; thus e.g., "Let a man meditate on mind as Brahman" and "He who knows this shines and warms through his celebrity, fame and glory of countenance". [18]

Upāsanā's immediate aim may be to unite the meditator with the object of meditation. But its ultimate aim is to unite the individual self with the Supreme Self. *Upāsanā* is based on the *Vedāntic* conception of Reality and operates within a definite conceptual framework. *Upāsanā* transforms the conceptual or indirect (*paroksha*) knowledge into intuition or direct (*aparoksha*) experience.

The *Upāsanās* are mainly meditations intended to act as correctives to the binding effects that are produced by the phenomena of natural processes. While what we call a natural process subjects us to its own laws, these laws can be overcome and their imposition upon the individual can be counteracted by techniques of meditation. The first five chapters of the *Chhāndogaya upanisad* prescribe the different types of *Upāsanā*. All these chapters guide on stepwise ascent of knowledge for the purpose of meditations which lift us above the phenomena of ordinary experience, such as birth and death and bondage of every kind, and point to the methods of transcending all sorrow, whatever be its nature, and regaining the originality of being. The various sections that follow are a systematic teaching on what we may call *Adhyätma-Vidyä*, or *Ätma-Vidyä*, knowledge of the ultimate Self, which is the only remedy for the malady of empirical existence.

There are various methods of meditation such as - *Pancägni-Vidyä*, the knowledge of the Five Fires, by which the *Upasana* means the various processes of manifestation, or, we may say, evolution, it being one's bondage and the way in which the cycle of transmigration revolves. There is a coming and going, descending and ascending in this *Samsära-cakra*, or the revolving wheel of bondage. How it happens, and how one can be free from it, what are the methods to be employed for the purpose of freeing oneself from the clutches of this involuntary law that imposes itself upon us and binds us to its own mandate so that we do not seem to have any say in the matter of births and deaths or even the experiences that we have to pass through—these are our themes. According to the *Brahmasütra* (3rd and 4th chapter) we can divide the whole *Upäsanä* mentioned in *Upanisads* in to three main groups. [19][20] :

1) *Pratekopäsanä* - where symbols of Brahman are used for meditation.
2) *Karmängopasanä* - In this meditation on the objects of Yajïas the idea of divinity is to be superimposed on the objects and not in the reverse way. *Adityadimatayaschanga upapatteh* .[21] (Br.Su. 4.1.6)
3) *Ahaìgrahopäsanä* Meditation on self is Ahaìgrahopäsanä and it the higher meditation. He who meditates on the Supreme Brahman must comprehend It as identical with himself. *ätmeti tüpagacchanti grähayanti ca.* [22](Br.Su.4.1.3)
4)

Some key points for medation suggested by vedic texts:

1. Meditation on Brahman should be continued till knowledge (realization of consciousness) is attained (*Ävrittirasakådupadesat*) . [23] – Br.Su.4.1.1
2. The erroneous notion "I am the body" can be destroyed only through constant meditation or repeated practice. If repetition is not necessary the Chändogya upaniñat would not have taught the truth of the great sentence "Thou art That" repeatedly.
3. *Äsénäù sambhavät* . One is to meditate sitting . [24] (Br.Su.4.1.7).41
4. *Dhyänäccha*. Further, such continuity of thought is meditation. It can come only when the limbs are not active and the mind is calm .[25](Br.Su.4.1.8) 41

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Upasänä being mainly of the nature of concentration, should be practised in a sitting posture, which is conducive to concentration.

5. *Achlatvam chäpekñya*

Immobility, stability, steadiness of the posture. [26](Br.Su. 4.1.9).41

6. There is no restriction of place with regard to meditation. *yatraikägratä taträviçeñät* . Wherever concentration of mind is attained, there it is to be practised, there being no specification as to place.[27] (Br.Su.4.1.11).41

Strength and limitation of the meditation as method to study consciousness

Strength : Realizing the self or pure consciousness, as it is, is not possible just with sense perception as well as logical discussions. Thus transcending the sense perception as well as logic is essential to realize consciousness.

Limitations :

i. (Not easily accessible)- Realization of the consciousness is possible only when the thoughts are restrained. To restrain thoughts one has to be virtuous. To discover the facts and figures regarding an external object, there is no need of one to be highly virtuous. One can remain a wicked and still be a great scientist or artist. But this is not possible in the field of spirituality. To realize the self one should be pure in one's heart.

ii. Cannot be shown to others (normal person). Since it is purely subjective and unquantifiable, it cannot be shown to others.

Conclusion

This article explores the Vedic paradigm of consciousness and deals with the most significant mean to study consciousness, in the light of *Katha* and *Chändogya Upanishads*. This also revels with the methods (different kinds of meditations) to realize the absolute consciousness dealt in the *vedanta*.

Finally, it is concluded that the modern science misses the investigation beyond matter. If it starts to explore that which is beyond matter, then only it can become complete. For further explorations the Yogic science can help. This article suggests the modern science for its further evolution by adopting the methods of Vedic science.

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[7] Ibid, chap.1.2.14.)

[8] Ganganatha Jha. (1942). The Chandogyaupanisad (The commentery of shankara) , poona ; Oriental Book Agency, chap.6.1.3.

[9] Ibid,.chap.6.1.4

[10] Ibid,.chap.6.8.6

[11] Ka.Up. chap 1.3.10&11

[12] Singh, T.D. (2008). Vedanta and science series, P- 17, Kolkata: Bhakti Vedanta institute

[13] Ibid, 1.3.13

[14] Ibid, 1.3.14

[15] Ibid, 2.4.1

[16] Ganganatha Jha. (1942). The Chandogyaupanisad (The commentery of shankara) , poona ; Oriental Book Agency,, chap. 7.26.2.

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Talk 10: (Hall 1)

Science, Mankind, Religion and Global Peace

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ABSTRACT

As on date, there is struggle for power, food, religions, status, threat of nuclear weapons, killing of lives by terrorists for different reasons, narrow feeling as human beings, all over the world. These lead to unrest, horror to life and restrain peace more or less throughout the world. It is necessary to have peace among all the human beings of the World i.e. "GLOBAL PEACE".

If there had been all types of living beings, other than mankind, then there would have been peace on the Earth. That means, there is no peace throughout the world, only due to existence and destructive activities of human lives, who are solely responsible for the deterioration of "Global Peace". So to bring back the peace on the Earth, the character of all mankind, should be tuned up to one

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habitable and disciplined character of ideal humanity, like other living beings. Since all are mortals, guests to the Earth and seek peace, then all should follow the path of "Religion Humanity", which covers, helping each other against poverty and crime.

"Global Peace" is in the true sense, the peace on the Earth. There is terrorism for the sake of religions, war between countries, colours feeling and crimes for different reasons all throughout the world. However "NOTHING IS IMPOSSIBLE" in this world, always solutions are there for every problem. The present topic is a paper on real, truth and practical based examples. Nothing is imaginary and frictional. Before taking up the matter on Global Peace, typical example of one country i.e. India can be analyzed. India is a developing country.

TO SEE A DEVELOPED INDIA; FIND CAUSES FOR DEVELOPING COUNTRY;

Almost seventy years is going to be completed, it is noticed, that there is poverty and crime in the country, although there are lots of resources. It is due to many reasons, such as difference of religions, castes, languages, stately feelings and socio-economic differences. These lead to lack of 'Morality', 'Unity' and 'Nationality' in the country, whose outcome is poverty and crime. These are the main causes for restricting 'Developed India'. There is quota system pertaining to religion and caste. These are mostly availed by creamy class people for which the actual needy are deprived of.

DISPARITY IN RELIEF TO HIGHER SECTS;

There are a group of people, who suffer from poverty, who are debarred of getting any quotas and other reliefs being higher castes, since independence, as if they are not authentic citizens of the country. These are definitely wrong conceptions in administration. For this entire BPL persons desirable for getting quota, are deprived of getting so.

COMMON CONCEPTS DESPITE DIFFERENCES

However, there are always solutions to the problems as per the situations in the country. There are two common factors among all the differences. These factors are that all are human beings and Indians. So the entire planning should have been based to elevate these two factors that no Indian should suffer from poverty and involve in crime. India is one secular country, so all the religions should be givenproper status. This can avoid religious discrimination and crimes.

ROLE OF THE PWSF;

Author is the Chairman of "PEOPLE'S WELFARE SUGGESTION FORUM"(PWSF), which is an apolitical organization, research unit and is acting as "THINK TANK". Forum discusses and finds solutions on critical issues and suggests the same to different states and central government. The present ADHAR CARD adopted throughout the country was initiated from this Forum.

USE OF ADHAR CARD;

During April 2009, it was suggested to the Ministry of Home Affairs, New Delhi to issue Indian Citizen Cards to all Indians, so that all other infiltrators from other counties can be segregated. This assignment was entrusted from Ministry of Home Affair to DrNandanNilikani to prepare the principle. PWSF also suggested in similar manner to DrNandanNilikani on the same issue. Finally, it came as Adhar Card.

MORAL SCIENCE FOR CREATING AWARENESS;

We have suggested to Ministry of Human Resources and all the Chief Ministers of the country for introduction of Moral Science as compulsory subject starting from class I to graduation (A separate chapter). The basic idea and gist of the course is based on proper humanity and ideal Indians only. The course will be emphasized to create poverty and crime free country.

CLASS I TO III;

The students of Class I to Class III, will be taught, that they are only Indians irrespective of their religions, castes and languages etc. They must be helpful to others and at the same time they are to be given lesson on how to take their food, wear dress, walk on the road, take care of health and behave with different categories of persons nicely.

CLASS IV TO X;

Similarly the students will be taught that even if a person lives for hundred years, still the time is less (A separate chapter). When there is birth there is death. That means we don't belong to this Earth. Rather we are all guests to this Earth. Since all have to depart from this Earth, we have to do well for the family, society, country and the globe before we leave. It is suggested in detail, how to live comfortably during four stages of lives such as: i. Birth to starting of study, ii. Starting of study to end of study, iii. Then service/ business to sixty years, iv. Finally sixty years to end of life. The course of study covers that a person can live well following the practical instructions provided in four stages of life.

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RELIGION HUMANITY;

The basic idea of growing proper humanity and feeling of only being Indians, have been mentioned in 'Religion Humanity" (A separate chapter). The "Religion Humanity" is the only character of an ideal person, while all other are religious ethics. There are sixteen points to be followed. These points are only based on practical means to succeed in life as on today. The points encompasses, writing the diary for tomorrow's work, work for the year. One must think oneself as judge in taking any decision. Never take decision hearing from one side only. What is the level of crime, what is the punishment for such crime and all should always be away from involving in crime, keeping in mind that "time is less". One must always be helpful to others and feel as Indians and "Country First", should be the principle of a student. This planning should start from school days. NCC, Scout, Guide and Yoga in school session will make the student ideal with smartness.

+2 TO GRADUATION;

In college curriculum, the idealness of the political leaders, the administrators, the official staffs, the industrialists, function of media, selection of leaders and the citizens in general, are to be taught. Similarly, they will be taught about the ideal persons of the world. NCC and military training during summer camp will make the students after fifteen years i.e. after graduation, not only ideal human beings, but also brave Indians. Such activities through the education will make the ideal parents, political leaders, administrators, teachers and citizens. This can make the country developed early.

GLOBAL PEACE;

Global Peace is for: - i. The Globe, ii. The peace of human beings on the Earth.

THE GLOBE;

The Earth and Moon came out of Sun in burning status since hundreds of crores of years ago. It took crores of years to cool down. During that period there were repeated hazardous effect of earth quake, tsunami, volcanic eruption, land sliding and other disasters like flood and super cyclone. Therefore the mountains, cavities and valleys have been formed in the Earth. But there was no water here, since water could be accumulated only within temperature of 100*C. The top surface of Earth further cooled down to below 100*C after crores of years, thereafter there was accumulation of water. The present situation of Earth, continents and oceans are the outcome of such evolution (Figures-below). After formation of water on the Earth, gradually the life cycle started in course of time. The existence of lives in water, air and land are the present status.

FEELING AS HUMAN BEINGS;

Human beings are one of the creatures of the Earth, among all other living beings. They are very brainy and intelligent. Human beings generally were living in a group and society with a leader of the group, who was strong and intelligent enough among all. When they found, water was very useful for day to day use and at the same time, they realized,water became very harmful in the form of devastating flood, the leader of the group declared, that there was Water God, who favoured, when happy and got annoyed when unhappy. Similarly, Sun, Wind, Earth etc. of different Gods and Goddesses were formed zone wise throughout the world and worship started in different ways. Therefore, the deities of the polar regions are different than that of the mountain, zone wise and so on. These religions generally never tallies.

Therefore, Gods were created by human beings, since thousands of years and so many ethics have been written basing on their convincing thoughts by different writers and authors in course of time.

No doubt the writings in the ethics are noble and convincing, but why poverty and crime still exist! That means, these are not functioning well.

CONTINENTAL DRIFT

In reality God, Religion and Caste are there in the World but we never rightly recognize them;

1.GOD:- Planet Earth was created from Sun and then existence of Parents became possible on Earth. So Sun, Earth and Parents are the real Gods for human beings on the Earth.

2.RELIGION:- Religion humanity, which is the ideal character/ property of human beings throughout the World.

3.CASTE:- Two varieties of persons i.e. Males and Females are the sole castes in reality for the Earth.

AGE OF SCIENCE;

Now it is an age of science. In each moment, whatever we use are based on science only. Persons have returned from Moon. The science has found out the planets at a distance of light years. About three hundred years back

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science was not developed. The conception of day and night, was due to the revolving of the Sun around the Earth in a day. Which was a wrong conception! We feel the children of present era are more advance, intelligent and scientific in comparison to the old. So, blindly believing old ethics and ignoring science is not at all desirable.

It is proved, that entire universe is made up of science, since the present steps to reach different planets and stars are based on only science. The miracle of visit of the Moon, sending space craft to other planets, viewing TV, internet service, talk through cell phones, running driverless remote controlled cars and all day to day uses, are outcome of science. We use gadgets without knowledge of actual scientific technic behind these. Science is developing fast yet the development is just like a morsel of sand in the vast field of universal creation.

HUMAN BEINGS;

We now see there is war between the countries, since years together, killing due to difference of colours appearance, robbery, riots, terrorism for the sake of religions and other feelings. The Earth is unrest. First of all, we must know our identity, that whoever have taken birth on this Earth, has to die. Birth is uncertain, but death is must. Of course, nobody knows the cause of death and also time of death. A soul takes birth in Africa may be different colour, than that of birth in European countries, Mongolian belt, South Asian countries, Polar Regions and other different countries, but all are human beings and will die one day. So, this Earth does not belong to us. We are just like guests to the Earth. Therefore, we should do only well for the family, society, country and the Earth. This should be the only motive for all.

PEOPLE OF THE EARTH;

If so, then why there is war between the countries and what for. Recently, there was earth quake in Afghanistan, which is Western part of India and in Myanmar, in Eastern parts of India. When earth quake, volcanic eruption and different calamities occur, these never remain bound within the boundary line of the countries, these affect as per the intensity of the disasters. The border of the countries, has been demarcated taking group of persons living in a particular administration of a country, but actually all human beings are habitants of planet 'Earth'. The principles and ways of each religion may be different. All the religions have been created according to place, situation and time wise.

The life of person is uncertain, that means the death may be from the time of birth to age old. One day, there were no lives on the Earth and there will not be lives, when it will be cooled and covered with snow and other gases. Then why such devastating activities of the terrorists like disaster killing people and destroying the Mother Earth. Let's all join together in the human mass of the Earth and lead ourselves for GLOBAL PEACE.

PEACEFUL MAINTENANCE OF RELIGIONS;

The religions are disciplinary and social bondages. Nobody should interfere in any body's religion. Let a person observe his worship in house, as well as in institution, but should not disturb others. Rather the person of one religion cooperates with the other religions, since all human beings are same throughout the world.

HELP EACH OTHER;

Similarly, every country should help the other countries, rather than creating conflict among themself i.e. India should help China and vice versa. Pakistan should help India and vice versa. In other hand, all developed countries, should help the developing as well as under developed countries, since the people of those countries, have not been risen up to developed countries as per circumstantial situations. So all countries should be elevated to developed countries to equalize the entire mankind.

MEANS TO ACHIEVE GLOBAL PEACE;

For achieving GLOBAL PEACE on the Earth,

1. All countries should reform their policies accordingly and enforce law strongly.
2. At the same time, the course of Moral Science, based on ideal humanity, should be introduced in all the countries to make idealism among all. The course of moral science covers point wise items for each class. The awareness, so generate, will make the parents, leaders, administrators, industrialists and citizens better,who will restrain to be in poverty and involve in crime, terrorism in course of time.

STOP DESTRUCTION AND PREVENT NATURAL CALAMITIES;

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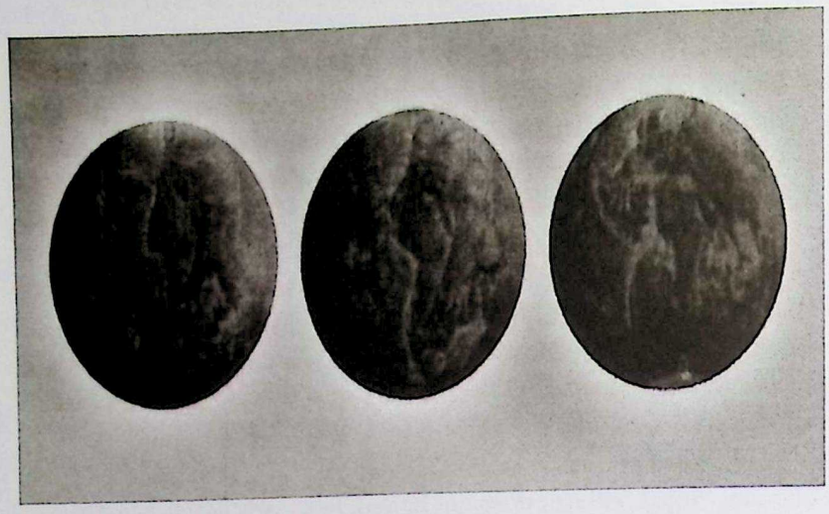
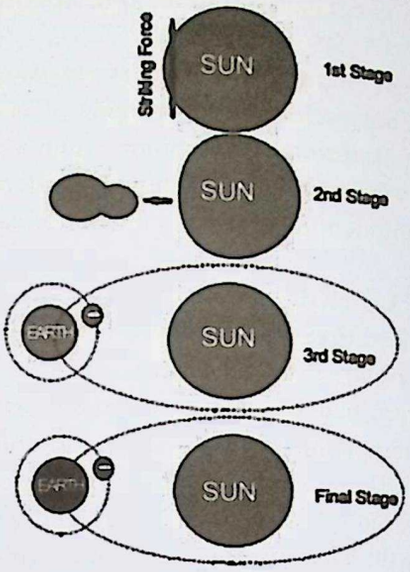
The manufacturing of bombs and ammunitions, should be stopped; rather different inventions and adventurous work, should be encouraged. They may try to face and avoid natural calamities by method of scientific invention.





CONCLUSION;
All are human beings of Planet Earth and will die one day. Therefore, all are guests to the Earth.So, entire mankind should be assets here, during the stay all must live well too. This will definitely bring peace for the Earth.

This is GLOBAL PEACE. Let our country, India drive on the matter first to create awareness among all the people, thereby, all the countries of the world.

NB- I would request the authorities of SRI CHAITANYA SARASWAT INSTITUTE, who intendto get peace in totality, to initiate on the matter and drive to get peace on the Globe.

Talk 10: (Hall 2)

Hinduism: science and spirituality

Padam Prasad Pande, M. Phil.
Retired Teacher, Kathmandu, Nepal

At first I should apologize for having neither scientific background nor Hindu religious studies in depth. I present myself as a lay Hindu, capable of observing both phenomena (of science and religion) with an open eye and inquisitive mind. As I have lived my life with this attitude and capacity, I have found Sanatan Hindu religion the most logical and scientific. The only condition needed is faith (Shraddha) to understand its deep meaning. Faith (shraddha) does not mean blind belief. Hinduism instructs questioning. There is Kenopanishad (Why? Upanishad); There is Prashnopanishad (Questioning Upanishad); Arjun, the devout devotee of Krishna questions Him,"How can I believe your saying that you had given this knowledge to the SUN in the beginning?" (Geeta, Ch. 4, SL. 4). Yet faith (Shraddha) is necessary to begin the search of any knowledge with full commitment; be it spiritual, natural or physical (Addhyatmik, adhidaivik or Adhibhautik) .

Unless we believe the seed will grow, we will not take the risk of cultivating it. We believe the atom or (proton, neutron, electron) of the nuclear, even if we haven't seen it. We believe in Big Bang theory, though it is impossible to prove it now. We believe the plane with take off and land safely even if we do not know the law of motion and aviation craft. We believe in some specialists who claim to have the knowledge based on guesses, some hints or some symbols, some logic and analogical resemblances, while passing through some hard process of experimentation and/or by taking the help of some instruments. (Shraddhavan labhate gyanam tatpara samyatendriya, gyanam labdhva param shanty machirenadhi gachchyati, Geeta,...).

Unless we have faith (shraddha), we will not put wholehearted effort to achieve it. We cannot hope to reach the depth of truth just by trivial efforts. So, faith (shraddha) is a must for any knowledge in depth. If we question the knowledge and practices of Hinduism with faith, we get

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answer rooted in positivity even in some impractical, inhuman like practices that have developed and degenerated during the long and adverse period in the past.

1. Hinduism speaks of a systematic biological oneness of the whole cosmos (Universe).

Brahman is one none others(Eko brahma dvitiyonasti); I am Brahman (Aham Brahmasmi); My mother is Parvati, father Maheswar, all people are brothers and sisters and the whole world is my family (Mata cha Parvati devi, pitadevo Maheswar, bandhava, manava sarve basudhaiva kutumbakam; let all be in comfort, let all be healthy, let all see the good and let any trouble never peep at us. (Sarbebhavantu sukhina sarbesantu niramaya…). These mantras give enough source to believe this concept that the real Hindu takes himself as a microcosm of the whole cosmos. We have to question the Hindu practices from this cosmological point of view to understand its essence.

2. The science behind Vernashram system (Verna+Ashram system).

At present many critics of Hinduism explain this Vernashram system as based on prejudice, injustice and partiality, dividing society into four different layers; Brahmin, Kshetriya, Vaishya and Sudra. The whole system of the society is put in these four categories, the think tanks (Philosophers), the rulers, the industrialists (producers and suppliers of goods) and the service providers. The vedic mantra, {Brahmanosya mukhamasheed bahu Rajannyah uru tadasya jyad Vaisyah padbhyagun Sudroajayatah) is talking about the same.

A. Verna Literally symbolizes colour Brahmin white, Kshatriya Red, Vaishya Yellow and Dark Sudra.

(This Hindu colour concept is just symbolic of qualities (GUNAS) and I do not think there was any connection of this symbolism with the apartheid concept in the West).

This theory believes that different people have different treats in personality by birth. Some tend to be simple, truthful, self restraining, virtuous and more hungry for knowledge than others (Philosophers), some are bold courageous impatient and virtuously aggressive (Soldiers), some are very thoughtful and calculative of profit and loss in every dealings (Industrialists) and some are simple, submissive, lacking courage but obedient to others ready to provide service to the needy (Service Providers).

Let's forget the cosmological vague concept; we cannot visualize it: let's be limited to the different parts of the micro unit, our own body. Is, the position they are provided and the value we give them, the same? The head is held high and gets the most and purest blood first, the legs are always carrying the load of the whole body yet they get the worst and the least at last. The face, eyes, nose, ears, mouth are on the head. Which parts of the body do we care more; the face or the feet? Are we doing this all naturally or with a feeling of being partial and prejudiced? The heart, liver and lungs are protected and kept behind strong bars of bone: eyes are behind the lids being obstructed every now and then; unnecessarily being disturbed and being teased unwanted or say automatically. Yet we are not ready to accept that we are partial or prejudiced to the different parts of our own body. We take it all as fair, logical and natural.

Modern psychologists also accept now that all are not made the same. All children cannot progress in any one field of study at the same degree even if we provide them similar environment. The claims of Pavlov, Thorndike, Skinner, and Watson like psychologists have now become limited to a little value. We have not yet come across cloned children, so we cannot say if they can be grown up or trained all alike. Otherwise even in the same family, the children will be of different nature. We strongly believe that every child is born unique and the Hinduism, ages back, has tried to classify those unique ones into four roughly divided categories of four Vernas. Modern psychologist, gardener has classified children in seven and afterwards eight different intelligence groups, our ancestors divided them into four.

This Hindu four verna theory when combined with genetic concept, the personality treats got related to the origin of birth. Otherwise any of Hindu scriptures do not connect Verna with birth. (Janmana Jayate Sudra, sanskaradvija uchyate, vedapathi bhaved vipra brahma janati brahmana- Manusmriti). (Chaturvarnyam mayashrishtam guna karma vibhagasha- Shrimad Bhagvad Geeta.)

It is common to make rough divisions in different ways and different categories. Somewhere we use three categories (good-better-best; bad-worse-worst: if we combine both, it becomes six). Sometimes we use four categories (first, second, third and the runner up) or five (Excellent, very good, good, normal and below normal). Sometimes we grade A, B, C, and D. This kind of general grading has been lately accepted as the best way of division due to our limited capacity to classify others accurately.

We can classify people as uttam, madhyam, nimna and nikrishta. Thus uttam people will help others at the cost of their own loss; (Yagya of 4 handful food in Kurukshetra), maddhyam people will provide help to others without any loss of their own, nimna people will cause harm to others for their own profit sake and nikrista people can be seen who take pleasure in doing harm to others just for nothing.

B. Four Ashram Vyavastha:

Four Ashram Vyavastha (Brahmacharya, Grihastha, Vaanprastha and Sannyas) is to remind the goals of life for the elevated, the reborn (dvijas) individuals to manage the whole life in such a way that the individual, family and society all enjoy life satisfactorily by achieving 4 puruswarth

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(Dharma, Artha, Kaama and Mokshya). Dharma pervades in all four ashrams, Artha and Kaama in Grihastha, and Mokshya beginning in Vaanaprastha and completing in Sannyas. Brahmacharya Ashram is for studying to learn theoretical knowledge, Grihastha Ashram for using the same knowledge in practical field, Vaanprastha Ashram, being equipped with theoretical and practical knowledge, for teaching other Brahmacharis and composing the proved knowledge in book forms and Sannyas, renouncing everything and teaching every one roaming around the world for chances of needy disciples and attaining complete liberation from all duties and attachments (Mokshya). These four Ashrams are mainly meant for dvivjas (born twice; once bodily similar to all and second by Sanskar developing higher qualities). Who are unable to take the second birth are classified as Sudras and for them obedience and service to all dvijas will automatically lead to complete liberation (Mokshya) as they have never been indebted of any other compulsory duties and they have nothing to be attached. So, complete liberation (Mokshya) for them is very easy. Once Jesus Christ also has said, "Everyone has to enter the door of god empty handed, those who have lots, may feel sad as they have to lose everything; fortunate and happiest are those, who have nothing to lose on the Doomsday.

3. Five compulsory duties of Grihastha Ashram: A dvija is prepared in Brahmacharya Ashram for fulfilling the duties of Grihastha-ashram humbly. The total but logical surrender and obedience to Guru helps to control ego. The egoless and learned Brahmachari gets to marry a suitable bride. The choice was given to the bride so it is called Swayamvara(Never swayamvadhu). After marriage, the bride goes to the groom's house which she has chosen. Then, the works at home are thus divided for males and females: sweeping, pounding, grinding, washing and cooking for women and five yajyas for males. The male has to do Dev Yajya, Rishi Yajya, Pitri Yajya, Balivaisvadeva Yajya (Bhoot Yajya) and Atithi Yajya. There is this clear division of duty for both the genders in the family and the fruits of both works being divided on equal basis.

Some critics tend to comment that low and difficult works are given to female. Lord Krishna, Balaram went from Mathura to Ujjain in Madhya Pradesh to Sandeepani Ashram to study. Without Study no Yajyas will be possible. How much practical would it be at that time for the female to do so? And the Mother Nature compeled female to be a mother, nine months of pregnancy, after delivery feeding caring by staying at home sounds very natural, logical and practical. What about the child's rights when females working long hours out of the house, leaving the new born in irresponsible care? What about the child right when female activists demand the right of abortion? The extremists always try to correct one at the cost of other. Hinduism seeks for proper balancing by bringing to equilibrium.

Some critics and activists highly criticized Hindu system of work division at home for limiting woman in the house and being protected by father, brother or son as Manusmriti says.

The concept of protection and value I have already given at parts of the body section above; the heart, lungs, liver and eyes most protected parts of our body. Something more arguments I want to add here about protection. Does the concept of protection come for more valuable or for valueless? Compare gold and iron things at home; compare the security of Presidents, Ministers and others in any democratic country where law declares all as equal. More valuable things and more important people are not left without security. How can we say it is bad or illogical? Manusmriti says mother is 100 times more valuable than father. It also says we have to worship them as goddess (Yatra naryastupujyante ramante tatra devata). They are more valuable and creative as the world depends on them for creations. One thing has been almost proved now that women are physically weaker than men. Any athlete, sports, weight lifting, boxing, running, jumping etc where physical strength is needed women have stood lower to men's record. Men are sometimes heartless, mindless, many incidents show it. Even now many countries discriminate them keeping in view their protection and so Manu did.

One Additional Episode on Women:

In the case of women, even veteran Hindu pundits blame Lord Rama for sending Sita to the jungle due to a washer man's criticism. Here, they forget the duty of a good king to make everyone in the nation happy and satisfied. The life in jungle or custody or even death will be a happy choice for any person devoted to some higher cause. Sita herself was committed to make Ramrajya an unprecedented model Kingdom on earth. As she was the queen, she herself was 50% responsible to accomplish the grand cause of the model kingdom, so nowhere we find her complaining against Rama. She well understood the grandeur of the issue. Rishi Balmiki was in Vaanaprasta, she got her two children, Lava and Kusha, there. She looked after her children's welfare; their education and training; the service of Balmiki who was also devoted to the same cause of propagating Ramrajya.

Another point activists criticize in the name of Hindu practice is Untouchability. Actually speaking, untouchability starts in Hinduism from birth to death; we start thinking which is touchable and untouchable the most with our own body, some less with family members, and very little in the community and nullified only in larger society. Whatever clean hand if fingertip touches water in a bowl is discarded, a pitcher touched by unclean person is discarded, a pond water washer man's area is discarded, the flowing river water is discarded only when is flooded, all other conditions welcomed. Pandits do not eat food, if their own left hand touches it, if they touch it without bathing, if some unbathed person touches, if some unsanskarit child of his own family touches and so on. Father cannot touch his own child before the 11th day; but, not only the mother but also other female members can. The child would tell if it could speak the difference of softness and roughness of female and male handling of the child. When we sit for mourning in someone's death, the wives and husbands cannot touch to each other,

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neither any outsiders can. If they touch by chance, both have to pass through the hardest punishment (Prayaschit) regarding untouchability. We try to understand reasons when a doctor prohibits us even from going near an ICU patient but we don't try to understand the reason in the case of child at birth, death ceremony, worshipping time, meditating time, eating time and so on. I can see logic in all these untouchability. No Hindu scripture says there can be any person or class untouchable, unless some logical behavior or conditions for not touching. It all depends on the situations, more related to hygienic conditions.

When Western people hear or read about untouchability in Hindu society they compare their own practice of hatred against blacks and think it inhuman incident. No doubt there are some inhuman practices even in our society. They are in every society in different forms.

Oxford dictionary in the example of first meaning defines untouchable as,"Drug barons are legally untouchable". In the example of second meaning it says,"Lower caste people are untouchable in Hindu system". So wrong concept.

3. Rebirth: Though we find some scholars in Hinduism that denied rebirth like Charvaak who said, "When body transforms into ashes, how can one come back again? (Bhashmi bhutasya dehasya punaragamanam kutah?), the main Sanatan Hindu system believes in rebirth. The nature of creation is the cycle of births and rebirths of all beings; some in short term, some in long; some for increasing the quality and some decreasing. Darvin, who saw evolution, could only observe the upward motion of the giant wheel. It is not evolution but revolution (Shrishti Chakra). Now we can understand very easily the cycle of seed-plant-fruit rotation; the seed-plant-tree and decaying rotation; sleeping and awakening cycle of every day and night; the cycle of hot-rain-cold seasons and so on. The rotation of Ice-water-steam-water; no loss but we gain and the gain is dexterity while passing through the process of the cycle. (Shraddhavan labhate jyanam..., Jyanam labdhva param shanty) We achieve knowledge that provides us peace and satisfaction.
4. Sanskaras: In Hinduism, the concept of Sanskara is very strong. This is the key that causes rebirth to a higher level. The actual meaning of Sanskara is betterment, refinement. There are sixteen sanskara categorized roughly. At present a few of them are still in practice in general; like naming, marriage, and death: other all sixteen are rare. In any sanskara, the main element is solemn oath (sankalpa) with time, space, origin and duty consciousness, and the value rests in keeping it up. Hindus belief of sankara, affecting the next birth, shows the ever lasting effect of strong commitment. Daily routine is so set to habitualize individuals in those sanskaras in practices that definitely changes our destiny. When a strong thought is uttered in words with full commitment and transformed into repeated actions, it develops into a habit; the collection of such habits develops into the form of character that determines the destiny of any individual.
5. Many collective festivals: Festival like Ekadashi, Purnima, Dashahara, Deepavali, Naagpanchami, Rakshyabandhan, Kushe amaavasya, haritalika, Ganesh Chauthi, Akshyaya Tritiya, Krishna Janmashtami, Ram Navami, Buddha Purnima, Holika Purnima, and like that many more other fixed festivals, which remind our relation with other beings in the cosmos. They also remind us all for practicing necessary activities, with much variety of them throughout the year that provide fruitful entertainment systematically. This helps generate similar thought vibrations around in the atmosphere.
6. Higherarchy according to age, knowledge and good practices with due respect indicates value given for experience, knowledge and good deed. While doing Namaskar by joining hands, the energy tips circulate through, bowing down and touching feet reduces ego, the end of hand and feet nerves circulates around us, blood flow increases to the head while bowing down. Through the feet and blessing hands the cosmic energy of the higher personality flows to the lower, practically putting both in one circle.

Different Inventers/Discoverers:

7. Greek mythology says Promitheus stole fire from heaven. Rig ved says, The sage Athervan extracted the agni (fire) Rig VI- 16-13. The priest churned for Agni as was done by Atharvan x-21-5. There are names of many instruments in VEDA.
8. They determined time era according to astronomical phenomena; Lunar year 354 days, Solar year 365+1/4th day and civil year 360 days.
9. Vamadev identifies Jupiter (Brihaspati) Rig IV- 50.4, Vena Bhargava identifies Venus (Shukra) Rig X-123.1 Father of medicine was Charak in human for other than the ethereal Aswinikumaras, , Bharadvaj (Sushruta) Surgery; Kanad Rishi in Vaishesika Darshan expounded ANU and PARAMAANU; Panini gifted the world with ZERO and PINGALA with the place value of numbers and decimal system; Medhatithi extended the numbers to billions; Aryabhatta laid foundation of Algebra, Legatha rationalized Astronomy and Baudhayana Geometry; Patanjali Ashtanga Yog.
10. Ayurveda, the ancient Vedic system of health care was Holistic and integrative addressing body, mind, relationships, emotions and spirit. Cagh, Vaat, Pitta balancing by food, mantras japa and meditations for mind, emotions and spirit. Modern, so called scientific allopathic is doing wonders in dissecting parts.
11. Kalpa Sutra in Sulva Sutra provides rules for constructing various shapes of altars and their permutations. They exhibit and algebraic geometry older and more advanced than early Egiptian, Babilonian or Greek geometry. The exact timing of the performance of the sacrifices was accomplished by people conversant with the movement of the stars. Jyotish, one of the six early (Vedangas) auxiliary sciences of the Vedas, reveals a good deal of astronomical knowledge.

Science behind other common Hindu practices:

12. Throwing copper coins in the river for purifying it constantly: showing gratitude to any service received from others, be it men, animals, nature and the cosmos.

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13. Putting tika chandan on forehead, the elements and symbols differing as Guna and Karma of four Verna to support the needed quality and showing clear identity.
14. Ringing bell and conch in temple informs that someone is present; the unique sound echoing for long is beneficial for concentration, for ears and for surrounding environment.
15. Eating system is sitting in folded legs (sukhasana) on the floor that activates the middle the middle part of the body for better appetite and digestion, with mantras (Vashudevam gadachakram trailokya sacharacham…) confirming that the food has come by righteous means and not polluted, circulating water around the eating place definitely stops ants and small insects, offering to gods first giving credit and becoming thankful to the natural forces for good production(Anna brahma rasovishnu…), then offering to five major Pranas(Pranaya swaha, apanaya, vyanaya, Udanaya samanaya) knowing that role of Pranas is most important than the sapta dhatus of the body.
16. Not sleeping with head to the North to avoid the bad magnetic effect in the head
17. Surya namaskar with different names of the SUN and different posture of the body indicating the different effect of sun rays in different 12 months, Surya-argha, pouring water from above head facing to the sun rays creating rainbow effect in the body, Tuppi/choti on the male head to conserve subtle energy ojas being created in Sahasshrar using as antenna for relating to the cosmic power; long hair and red colour clothes for female for conserving reproductive heat in the body; fasting system time and again makes body stronger in the logic as survival of the fittest.
18. White coloured clothes for widows if they don't want to remarry and so they do not need reproductive to heat supply in the body. Male will have always white to reduce heat in the body so that they could observe Brahmacharya, abstaining from sex for the long period while the wife passes through pregnancy, delivery and complete growth of the child before the wife is ready in every respect for conceiving another child.
19. Worshipping Peepal the biggest tree and Tulasi the smallest herb denoting medicinal and oxygenic value, the source of healthy long life.
20. Idol worshipping is relating to creation, decoration art, concentration seeing the form that reminds its quality.
21. Temple and houses making time using copper plates and pots, worshipping with Jyoti, dhoop, flowers, chandan akshyata, works for gravity, thunder hit and many other natural defense mechanism.

Summing up

We may define Spirituality as the science of truth, reality, or essence of anything SAT-CHID-ANANDA that is how we define Brahman. Shesh sayee Vishnu, Shivalinga, Ardhanariswar, the whole is as the whole of sound in AUM. So AUM is called Brahmn of sound (SABDA BRAHMAN).

Hinduism never knew the antagonism of science and spirituality, philosophy and theology that the west witnessed. Subject consciousness and Object reality: where the minutest part of object ends the lowest part of consciousness starts. They both meet at the center as the shape of DAMARU of SHIVA. The beating of Damaru is the symbol of the first vibration of the creation.

Science isolates and eliminates all that is not immediately verifiable or measurable through physical instrumentation, sometimes confining and limiting its growth and power of discovery beyond the present by conscience.

Central to both science and spirituality is seeking for truth and trying to grasp the essential nature of reality by going deeper and deeper (Indriyani paranyahur indriebhya param mana….). The goal of science is to explore diverse components of the physical universe, cause and effect, actions and reactions of binary oppositions; whereas spirituality is studying the whole cosmos; the link that relates to each other and to the whole. Science studies the micro (JIVA) and spirituality studies the macro (SHIVA). Even recent scientific discoveries seem to validate the concept of Brahman as the UNIFIED FIELD. The Vedantic concept Brahman and the UNIFIED FIELD of physics, AUM the first vibration and big-bang, appear to be synonymous.

Big bang in some stages of creation we see, as when a baby or any fetus falls out of the womb, it must be a big-bang for the new born; similar big-bang when a chick breaks the shell and the outside light flashes its eyes, that must be a big-bang. Similarly, the death that we witness, falling of a dead elephant or a warrior but we know the death is same every moment but the last we identify, other we don't.

In a recent article, in the U.S. News and the World Report, physicist Roger Penrose theorized that the Big Bang might be one in a cycle of such events suggesting that the universe has had multiple existences. Albert Einsteins hypothetical experiment of "twin paradox" is similar to Bhagavat Purana's relativity of time, "Time can control only those who are body conscious, even up to the Satyaloka or the other higher planets of the universe". "Science without spirituality is lame and spirituality without science is blind", Albert Einstein, "We are balls of Energy slowed down to become mass; if we speed up we become pure energy again".

There is wonderful synergy between science and Veda, it is all knowledge and wisdom, providing us knowledge about the universe we live. By knowing which we can understand how decaying body transfers into the cosmic energy breaking all bondages and attaining mokshya.

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Talk 11: (Hall 1)

Concept of Body and Mind in Vedic Philosophies

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The mind–body problem is the question of how the human mind and body can causally interact. This question arises when the mind and body are considered as distinct, based on the premise that the mind and the body are essentially dissimilar in nature. One of the earliest known formulations of mind–body dualism was expressed in the eastern Samkhya and Yoga of Vedic ideology (c. 650 BCE), which divided the world into Purusha and Prakriti. Specifically, the Yoga Sutra presents an exploratorytechnique to the nature of the mind.

The problem was addressed by René Descartes (1641) in the 17th century, resulting in Cartesian dualism, and by pre-Aristotelian philosophers, in Avicennian philosophy, and in previous Asian societies. A diversity of methodologies has been suggested. Most of them are either dualist or monist. Dualism maintains an inelastic dissimilarities between the realms of mind and matter. Monism maintains that there is only one combining genuineness, constituent or spirit in terms of which everything can be clarified.

Numerous philosophical viewpoints have been established which throw away the mind–body contradiction. The historical materialism of Karl Marx and subsequent writers, itself a form of physicalism, held that consciousness was engendered by the material contingencies of one's environment. A clear refusal of the contradiction is found in French structuralism, and is a situation that normally considered post-war French philosophy.

In the western philosophical tradition there are numerous philosophers since ancient time to modern those discussed to solve the contrast of dualism. Plato, Aristotle, René Descartes, Immanuel Kant, Huxley, Whitehead, Popper and John Searle etc., are contributors to the western mind body problem.

Such a dualistic contrast are also found in Vedic philosophical traditions since Vedic period and onwards. Here, I will try to examine mind-body concepts and relationship in Vedic philosophy, not as a problematic standpoint, but in informative prospective to raise interest to research in this field.

I want to strong note here that the substance Dualism is a collective feature of several Vedic Hindu faculties, including the Samkhya, Nyāya, Yoga and Dvaita Vedanta. In these faculties a vibrant alteration is drawn between matter and a non-material soul, which is eternal and undergoes Samsara, a series of death and rebirth.

The Nyāya philosophy argued that qualities such as cognition and desire are inborn qualities which are not controlled by anything solely material, and therefore by a process of abolition must belong to a non-material self, the Atman. Many of these philosophies see their spiritual goal as Moksha, liberation from the cycle of rebirth

The Vedas are considered to be source of whole knowledge of Vedic Nepalese traditions since ages as the Vedas are believed to be composed about 6000 BC to 1500 in the plains of Bharatbarsha or caves of Himalayan ranges by contemporary academics. But traditional Hindu community accepts as true that Vedas are immortal and composed by none, but realized and reveled by spiritually qualified self-realized Risis in Samadhi. Veda is ultimate, unlimited, immutable, absolute and immortal properties of Brahma wherein all seed of entire universe contains as a word - form that is known as Shabda Brahma in practical world.

Thus, the Samadhi is most qualified and highest position of Tapa, where a spiritually qualified Rise or other pinancing individual can accomplish favorite and required power for material or divine purpose. It is called Tapa. I don't see any proper English synonyms of Tapa. It is told that Brahma, the creator of the universe, went to Tapa before starting creating the universe that he could achieve unlimited power to complete the creation of the universal properties including Human.

There are several instances in Rigveda. According to some hymns the body is the residence of Atma what is Brahma himself. The human body is created by five gross materials. Body शरीर, Mind मनस् and finally; the Atman आत्मा are Vedic construction of mind body relationship. Atman is bearer, owner as well as consumer of Body and Mind affairs without being affected worldly phenomenon related M&B. Vedic understanding about the body is very clear. The body means the physical appearance of human feature winch includes five sense organs and five motor organ.

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Nasadaiya sutra clearly has mentioned that the body is responsible for bodily properties and the mind is the regulatory authority of a body when decision making process of actions. If there is no body, the decision about an action is not possible. According to Vedic philosophical traditions, the body is represented of animal conditions: food, sleep, fear and sex and the Mind make human distinct from the animal world. Notion ज्ञान is the property which makes human distinct from animals.

The Upanishads are also carrying the idealistic concept as they are carrier of monastic schools. "There are two birds on the tree of eternity. One wanted to test worldly pleasureand fell down body life and another remain on the tree. Bodily Atma started to be contaminated within a body with intervening of Maya and forgot the real position. But this dualism is totally different than the western mind-body problem. In Vedic philosophical properties, the Men are part of the material world, not a soul. Thus, there is not same union problem as western dualism facing.

Samkhya is body and Yoga philosophy is mind. Samkhya is the theoretical expression of Mind and Yoga philosophy is a practical union of Mind with the body. In my opinion, the western concept of Mind is related to intellectual properties, but the word "Mana" or मनस् has more properties of emotions. Yoga philosophy tried to Combine Mana and Mind as Chitta. The cheetah is the vessel or the mixing pot where the body and mind get together to interact with pure प्रज्ञा.Chittacan't be compared with Descartes's dualism. In Descartes there is no final solution of the dualism but Yoga philosophy clearly achieves the goal of unity in Samadhi what is recognized as Moksha. Moksha is the common goal of almost all Vedic philosophies.

Yoga philosophy is also essentially dualist in nature, but concept of body and mind is different than western dualism. According to yoga the Manas is the directing power behind all actions. It possesses the capacity of attention, selection, etc.; it synthesizes the discrete manifold of the sensations. It can perceive, but cannot conceive, and constituted as Chitta and ChittaVritii in the theoretical world.

Buddhist traditions describe that the mind manifests moment to moment as sense impressions and mental phenomena that are continuously changing. The moment-by-moment manifestation of the mind-stream has been described as happening in every person all the time, even in a scientist who analyses various phenomena in the world, or analyses the material body including the organ brain. The manifestation of the mind-stream is also described as being influenced by physical laws, biological laws, psychological laws, volitional laws, and universal laws.

A noticeable feature of Buddhist philosophy which sets it apart from Vedic tradition is the importance of the doctrine of not-self or अनात्मा The Buddha's not-self doctrine sees humans as an impermanent composite of five psychological and physical aspects instead of a single fixed shelf. In this sense, what is called ego or the self is merely a convenient fiction, a delusion that does not apply to anything actual but in a mistaken way of looking at the ever changing torrent of five unified aggregate features. The affiliation between these aggregates is said to be one of dependent-arising. This means that all things, including mental events, a rise co-dependently from a plurality of other causes and conditions. This seems to reject both causal determinist and epiphenomenalism conceptions of mind.

More notes, the Vedic concept of the human body is equally material and spiritual. The Upanishad says that the body is manifestation several Gods and goddess. The body has a full replica of the universe, what is called Biswarupa (chhadogya and SrimadBhagwatam 2/2) and mind is a bodily property which exposed several emotions. The Buddha is the controller of body and mind both. We should not confuse that the consciousness is the replica of the Soul or Purusha, which is never contaminated with bodily affairs.

Nyaya, Vaiseshika, Shankar Vedanta, RamanujaVedant also has domestic approaches, buteven those philosophies the mind is part of the bodily subject controlled by Buddha. In this respect, there is clear that the western concept of the mind body problem does not exist in the Vedic philosophical tradition. Hence, we can't ignore the union or first causal problem of evolution in Samkhya philosophy as well.

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Talk 11: (Hall 2)

Psychology Behind The Origin of Man and Woman in Indian Thought

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ABSTRACT

The origin of the first man and the first woman has become unsolved riddle in this universe. Many biologists, sociologists, scientists and philosophers have propounded their own theories to solve this riddle. Many religions, religious preachers and religious texts have narrated various stories to explain and to convince a common man about the creation of first man and first woman. It should be noted that all the cultures of the world have discussed this matter under the influence of their psychological approach. This psychological approach helps to understand the relation and the attitudes between man and woman.

The present paper explains the origin of man and woman depicted in the Upanis□ats. The Supreme Brahman decided for creation. He divided himself in two parts. He ordered to those parts to procreate the beings. The Purānas named those parts as Svāyambhuvamanu and Śatarūpā. Both of them took various forms and copulated each other and procreated many species. The concept of such creation appears even in the Prakriti-Purusha theory of Sānkhya philosophy and in Ardhanārīśvara concept of Śaivas and Śāktas.

The above theories clearly show the psychology of Indian culture. As man and woman are emerged from the Supreme Brahman they are equal and they are sacred. There is neither superiority nor inferiority among them. They came in to existence to continue the progeny. Hence man without woman and woman without man are incomplete and imperfect. When they unite each other they will be perfect and complete. Hence we see equality, equal rights and equal responsibility for man and woman in our culture.

The origin of the first man and the first woman has become unsolved riddle in this universe. Many biologists, sociologists, scientists and philosophers have propounded their own theories to solve this riddle. Many religions, religious preachers and religious texts have narrated various stories to explain and to convince a common man about the creation of first man and first woman. It should be noted that all the cultures of the world have discussed this matter under the influence of their psychological approach. This psychological approach helps to understand the relation and the attitudes between man and woman.

India is known for its' spirituality. India is respected as philosophical land. Hence it is glorified as sacred land. The Vedas, the Upanishats and the Puranas have narrated the evolution of the world or the creation of the universe. The narration clearly sheds light on the origin of man and woman. The Br□hadāran□yakopanis□at, in this connection opines that – there was soul alone in the beginning in this world. He had no delight. Therefore one alone has no delight. He desired second. He was indeed as large as a woman and a man closely embraced. He caused that self to fall (pat) in to two pieces. There from arose a husband (pati) and a wife (patni). Therefore this one-self (sva) is like a half-fragment as Yājn□avalkya used to say. Therefore this space is filled by a wife. He copulated with her. There from human beings were produced. (Hume's translation) [1] According to this opinion, formerly there was soul alone in this universe and that soul is eternal (nitya) truthful (satya), knowledge (jnānam) and infinite (ananta). It is full of bliss. According to Śankarācārya the soul or the Ātmā is nitya-Śuddha (eternal pure), nitya buddha (eternal intelligent) and nitya mukta (eternal liberated). That soul was not happy as it was alone. For pleasure it was in need of a company. Hence it divided its' body in to two pieces. Those two pieces are called pati and patnī i.e. husband and wife. Thus the first man and woman were created in this world.

The above concept reveals that man and woman is the product of pure soul. Hence they are pure. As they are the product of same soul they are equal. There is neither superiority nor inferiority among them. Moreover man without woman and woman without man is incomplete and imperfect. They become one or complete or perfect when they unite each other. Hence union or copulation of man and woman i.e. pati and patnī has been considered as sacred as sacrifice in India.

The Brhadāranyakopanisat, further states that – She then be thought herself; How now does he copulate with me after he has produced me just from himself? Come let me hide myself. She became cow. He became bull. With her he did indeed copulate. Then the cattle were born. She became a mare, he is a stallion. She became a female ass, he a male ass. With her he copulated of a truth. Thence were born solid hoofed animals. She became a she goat, he a he-goat; she an awe, he a ram. With her he did verily copulate. There from were born goats and sheep. Thus indeed he created all whatever pairs there are even down to the ants. (Hume's translation). [2] This passage narrates the creation of pairs (mithuna). It should be noted that the female part of the soul thinks that she has been created by the male part and it is not fair to copulate with him. Hence she takes various forms (species) to hide herself from him. But the male part of the soul takes the masculine form of those species and copulates with female. Thus animal world came in to existence. Here we observe that the female part of the soul takes

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another form on account of bashfulness. And it initiates male part of the soul to change his form for copulation. Hence female has more responsibility in continuing the race.

In another context the Brhadāranyakopanisat states that – In the beginning this world was just the Soul (Atman) one only. He wished that I would have a wife; then I would procreate.[3] The same idea is depicted in the Praśnopanisoat also. It states – The Lord of creation (Prajāpati) was desirous of creatures (offspring). He performed austerity. Having performed austerity he produces a pair, matter (rayi – feminine) and life (prāno) thinking these two will make creatures for me in manifold ways.[4] The texts reveal that for procreation a pair is necessary and it is not possible from alone. Therefore the Soul or Ātman or Prajāpati creates another one for creation. Hence male and female or man and woman is necessary for procreation. Man and woman are recognized as a pair (mithuna). The Śatapathabrāhmano clearly indicates that a mithuna always consists of male and female[5] and the purpose of mithuna is progeny or procreation.[6]

The upanisoadic concept has been elaborated in the Purāoas. According to the Matsya Purāno, Lord Brahma meditated on Sāvitrī for the creation. During the meditation his pure body (akalmasoam) divided in to two parts. One part has female form and another part has male form. And the male form was known as Svāyambhuva manu and female form was called Sāvitrī, Sarasvatī, Gāyatrī and Brahmānī.[7] The Vishnu Purāna narrates that – Brahma created himself the Manu Svāyambhuva, born of an identical with his original self, for the protection of created beings; and the female portion of himself he constituted Śatarūpā, whom austerity purified from the sin (nirdhūtakalmasām) and whom the divine Manu Svāyambhuva took to wife.[8] The Mārkandeyapurāna also states the matter with same words.[9]

The stories elaborated in the Purāoas have same sense. The Upanisoadic Brahman has transformed in to Caturmukhabrahma in the stories. The male part of that Supreme Soul is named as Svāyambhuva Manu and female part as Śatarūpā. Svāyambhuva Manu means a person who is self existent. Formerly he was there in the form of Brahman and he desired to take the form of Svāyambhuva Manu. The name Śatarūpā denotes that a woman capable of taking hundred (many) forms. The term hundred is not confined to numerical hundred but it denotes innumerable.

The term Manu is derived from the root 'man'. The terms 'manushya' and 'mānava' are from manu only. The English word 'Man' is also near to Sanskrit root 'man'. The above concept and the stories regarding the origin of man and woman clearly points out the following matters:

Man and woman is the product of same cause.
The cause is pure Brahman only.
Hence man and woman are pure and sacred.
They are equal and there is neither superiority nor inferiority among them.

All these points are seen in Indian thought. The Sānkhya darśana or philosophy depicts the concept of Prakroti and Purusoa. According to this school of thought, the Prakroti is the material cause of this universe, whereas, the Purusoa is the efficient cause of the universe. The Sankhya philosophy states that both Prakroti and Purusoa are Sat (good and real) and both are Anādi (without a beginning) and Ananta (without an end - that is, infinite). The Purusoa is detached from the material world, hence is Asanga. Prakroti as the name implies, is the creator, the doer. Therefore, Prakroti and Purusoa are completely and distinctively different from each other. Purusoa is sentient but inactive, while Prakroti is non-sentient but active. Purusoa is the alert, conscious mind, but is Akartā (does not do anything). Prakrti, on the other hand is the Kartā (the doer), but at the same time, does not work at the level of consciousness. According to Sānkhya philosophy Prakrti and Purusha are two aspects of the Brahman or the Creative Consciousness. While Prakroti is likened to the creative energy and Purusoa is the consciousness that is the power of Brahman. While Prakroti gives shape to things, Purusoa helps manifest them as part of the universal consciousness. Thus we can say that Purusoa is the first man and Prakroti is the first woman. The creation of the world begins when they join each other.

The concept of Prakrti and Purusha is seen in the concept of Ardhanārīśvara. Ardhanārīśvara androgynous one is an aspect of Lord Śiva whose form is half man and half woman. The concept reveals how the female principle of Śakti is inseparable from the male principle of Śiva. The followers of Śaiva and Śākta cult believe in the divine unity of Śiva and Śakti and that unity is the ultimate truth. Here Śiva represents man and Śakti represents woman. They are inseparable and their unity represents oneness, wholeness and completeness.

The theories regarding the origin of man and woman prevailed in India have some common points. Man and woman are created by one cause and that cause is pure and sacred. Both are equal and both have potentialities to procreate. But procreation process begins when they both unite or join together. Alone cannot create. Therefore in India and Indian culture both man and woman have same respect, same honor and same dignity.

The theory of Manu and Śatarūpā resembles to Adam and Eve of West, Ask and Embla of Norse mythology, Mashya and Mashyana of Zorostriyan and Yin and Yang of Chinese Taoism. But there are basic differences between them and those differences display the psychology of their culture and thought.

In Adam and Eve theory God created Adam deliberately. But in Indian context Brahman himself divided in to two pieces to create the world.

According to Bible woman was created from the rib of the man and in Indian tradition she emerged from the Brahman from which man was emerged.

There is no mention of SIN and throwing out from the Garden of the Eden directly in Indian thought. The sat-cit- ānanda Brahman is nitya Śuddha, nitya Buddha and nitya Mukta. He has neither form nor body. But when he takes the form of Svāyambhuva Manu and Śatarūpā, he gets male and female body. The body consists of five elements, five organs of action, five organs of senses, mind, intellect and ego. All these elements create kāma, krodha, lobha, moha, mada and mātsarya in every beings. On account of

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these, all the beings enter into the samsāra. Samsāra according to Indian thought is cycle of birth and death as well as pleasure and pain. On account of good karma one will gain good birth and good loka; and on account of bad karma one will take birth in lower species and in lower level loka. Man commits sin due to selfishness. He becomes selfish on account of his enemies. i.e. kāma, krodha, lobha and so on.

According to the karma the Jīva or soul enters different types of lokas. Our traditional texts mention three lokas viz. Svaraga-loka, Bhū-loka and Naraka-loka at one par and fourteen lokas (bhū, bhuvah, svah, mahah, janah, tapah, satyam at upper level; atala, vitala, sutala, tala, talātala, rasātala and pātāla at lower level) at another par. All these lokas are meant to experience pleasure and pain according to karma.

There is no mention of Devil disguised as serpent that instigated to eat forbidden fruit. But Indian tradition mentions six enemies of the man which instigate to indulge in forbidden actions. Kāma, krodha and other emotions are known as ari□ad□-varga. Lord Kr□□n□a declares in the Gitā that Kāma and Krodha are two powerful enemies of the man and they are the gates for the hell.[10] Though it is difficult to control over the mind, it is not an impossible task. One should try to control it gradually. The person who succeeds in curbing the desires of the body, organs and the mind will lead not only a happy life but also achieve the last pursuit of life i.e. Mukti.

Under this back-ground an Indian considers that his body is an effect of five elements and at last it merges in five elements only. In the same way his soul is a particle of the Brahman and at the end it should become one with the whole Brahman. Hence every individual in India considers himself as pure and fit to liberate from the bondage of samsāra.

Thus the origin of the man and woman in Indian thought appears like western but the psychology behind those theories differs a lot.

References

1 आत्मैवेदमग्र आसीत् ...। स वै नैव रेमे, तस्मादेकाकी न् रमते, स द्वितीयमैच्छत् । स हैतावानास यथा स्त्री पुमांसौ संपरिष्वक्तौ । स इममेवात्मानं द्वैधापातयत् ; ततः पतिश्च पत्नी चाभवताम् ; तस्मादिदमर्धबृगलमिव स्व इति ह स्माह याज्ञवल्क्यः ; तस्मादयमाकाशः स्त्रिया पूर्यत एव तां समभवत् ; ततो मनुष्याः अजायन्त । बृहदारण्यक. १.४.१, ३

2 सो ऽयमीक्षा चक्रे कथं नु मात्मन एव जनयित्वा सम्भवन्ति हन्त तिरोऽसानीति, सा गौरभवत् ऋषभः इतरः , तां समेवाभवत् ततो गावोऽजायन्त, वडवेतरभवत् अश्ववृष इतरः, गर्दभीतर गर्दभः इतरः, तां समेवाभवत् , ततोऽजावयोऽजायन्त , एवमेव यदिदं किंच मिथुनं आ पिपीलिकाभ्यः तत्सर्वमसृजत् । बृहदारण्यक १.४.४.

3 आत्मावेदमग्र आसीदेक एव सोऽकामयत जाया मे स्यात् अथ प्रजायेय ...। बृहदारण्यक १.४.१७.

4 प्रजाकामो वै प्रजापतिः स तपोऽतप्यत स तपस्तप्त्वा स मिथुनमुत्पादयते रयिं च प्राणं चेति एतौ मे बहुधा प्रजाः करिष्यत इति । प्रश्नोपनिषत् १.४

5 मिथुनं एकश्च एका च । शत. ब्रा. १.४.५.७

6 इन्द्रं वै मिथुनं प्रजननम् । शत. ब्रा. १.१.१.२२

7 सावित्रीं लोकसृष्ट्यर्थं हृदि कृत्वा समास्थितः । ततः संजपतस्तस्य चित्वा देहमकल्मषम् ॥ स्त्रीरूपमर्थमकरोदर्धं पुरुषरूपवत् । शतरूपा च सा ख्याता सावित्री च निगद्यते ॥ सरस्वत्यथ गायत्री ब्रह्माणी च परंतप । मत्स्यपुराण.३. ३०,३१,३२

8 ततो ब्रह्मात्मसम्भूतं पूर्वं स्वायंभुवं प्रभुः । आत्मानमेव कृतवान् प्रजापात्ये मनुं द्विज ॥ शतरूप्यां च नारीं तपोनिर्धूतकल्मषाम् । स्वायम्भुवो मनुर्देवः पत्नीत्वे जग्रहे विभुः ॥ विष्णु पुराण. ७. १४,१५

9 ततो ब्रह्मात्मसम्भूतं पूर्वं स्वायंभुवं प्रभुः । आत्मनः सदृशं कृत्वा प्रजापात्ये मनुं द्विज ॥ शतरूप्यां च नारीं तपोनिर्धूतकल्मषाम् । स्वायम्भुवो मनुर्देवः पत्नीत्वे जग्रहे विभुः ॥ मार्कण्डेयपुराण. ४७. १३,१४

10 काम एष क्रोध एष रजोगुणसमुद्भवः । महाशनो महापाप्मा विद्ध्येनमिह वैरिणम् ॥ गीता ३.३७

त्रिविधं नरकस्येदं द्वारं नाशनमात्मनः । कामः क्रोधस्तथा लोभस्तस्मादेतत् त्रयं त्यजेत् ॥ १६.२१

Talk 12: (Hall 1)

The Psycho-spiritual Cognizance in the Sacred Vedic Art, Architecture and Iconographic symbols

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Abstract

With the advent of the western somatic (materialistic/ying) model of scientific system of inquiry the eastern model of cultural, spiritual, natural and art-iconographic model of quest for (deeper) psychic investigation and human enlightenment (tradition) had been dominated, ignored and eclipsed. Over past millennium, after the fall of paganism (bearing ancient Vedic cultural links) the consequent decline and fall of the (then existing) Roman civilization; the subsequent conversion of emperor Constantine further destruction of pagan arts of Europe and elsewhere in the globe ensued. In such phase of modern western history today's science had erroneously evolved with a diminished and shrouded appeal for ancient art, spirituality and culture wherein uncommon wisdom is still contained. Modern scientists still have ignored this grave historiographical context. The evolution of modern science therefore has lost its important (spiritual/yang) psychic approach to reality, hence the present consequence of global obsession and fanaticism for materialism, militarism and consumerism being ever growing in both the East-West sphere. In the surviving eastern artifacts and cultural heritages (tangible/intangible) meant for deeper spiritual experience, the cognizance of which is inherently scientific and pragmatically holistic based on psycho - spiritual laws of nature and life. The Vedic art, architecture and iconography are so designed to create a psychic induction in the seeker, observer or the participant for the subtle experience of the higher laws. The psycho-spiritual cognizance seems to function at the microcosmic 'psyche' of the participant. Upon mindful cognizance, the sacred architecture(macarocosm) tend to momentarily alter the participants skanda to form a sort of "transitional skanda" through certain

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esoteric laws of sacred geometry(and other principles) inducing the temporary altered state of consciousness, thereby paving way towards realizing a holistically 'Realistic Paradigm.'

Introduction

There is a clear difference between sensory experience and psychic experience as the former is dependent on the sensory data flow through sensory organs from an observer's point of view and the respective sensory tracts whereas the psychic experience of the participant, whether partial or whole lies is in the psychic realm . Psychic experience is a form of self-enrichment experience or a state of self-actualization .This connotes the realization of the sanctified spiritual domain . Cognizance, although is a widely used psychological term ,here it connotes both the context : as in the sensory or in the transcended context because it is ultimately the experience that create the sense of cognizance either physical/ differentiated sensory(somatic/physical structure) or unified spiritual(the psychic *skanda)*.The induction thus arise is due to the functional influence in a being through information flow and psycho-spiritual cognizance from the art, architecture and iconographic forms instantaneously or gradually to alter the psyche of the being. The formulated sacred art and architecture seem to invoke the transcendental dimension at certain psychic depth therefore the tradition of image worship finds scientific validity in this *'sacred paradigm'.*

The psychological cognizance to visual experience

Esoterically, the Vedas are understood as the supreme sacred wisdom of the spiritual laws and the natural laws ; mind and matter that function eternally, either bonded or as liberated. Therefore, when we speak of the functioning sacred Vedic wisdom it connotes the experiential *skanda,* the sphere of complete cognizance. In fact, the Vedas do not exactly mean the book(s).It means the ultimate realization (so reminds the *sruti-smriti* tradition) or realistic, enlightened cognizance if put in simpler words. Reality is reflected within and not without. Fortunately, the outer fleeting sensory field that creates illusion in the mind projected in the *skanda* can be intentionally observed. With the implementation of some defined, esoteric laws the illusion can be broken down by altering the conditioned, observable, cognitive *skanda*.During prolonged contemplation the *sadhakas* seem to discern between the illusionary and the realistic functional experience of the *skandha* during the yogic concentration and *Samadhi* ie. *Samprajnana Samadhi* and *Asamprajna Samadhi* attained through distinct individualized effort.Yet,external laws of synchrony through sensory cognizance are also known to influence the deep unconscious *skanda* at the mass level all the while sacred art, architecture play the profound role exoterically and even esoterically.

The Buddha's teaching in the Pali Canon describes human psychic construct as the five aggregates (skandas) :

1).form or *matter* 2).sensation or *vedana* 3).perception or *samjna 4)*.mental formations or *samskar 5)*.consciousness or *vijnana*

In general practice the individual is considered unreal and the *skandas* are considered to some extent,real.The Buddhist context of *Vedananupashyana* is the contemplative aspect where fundamentally *vedana* (sensation) is used as a tool of liberation universally through detached observation as according to the law of *Abhidhamma.* Although,modern Buddhism disregard the Vedic origin of wisdom (ie. *prajna)* the Buddhist *sadhana* system of spiritual cognizance is completely Vedic in origin as it incorporates *Vedana* as vital tool(*alamban*)for sadhana ie. *the law of dependent origination* . The Buddhist literature discusses the psychic *skanda* as:

1. Cognizance,that which discerns (*In the Nikayas/Agamas*)
2. A series of rapidly changing interconnected discrete structured acts of cognizance (*In the Abhidhamma*)
3.The base that supports all experience*(In some Mahayana sources)*

Looking through the modern psychological context, theories of integrative function for unified experience present solutions to two classic problems associated with consciousness: *differentiation* and *unity.* They show how our conscious experience can discriminate between virtually unlimited number of different possible scenes, structures, shapes and details (differentiation) because it integrates those details from our sensory systems, while the integrative nature of consciousness in this view easily explains how our experience seems unified as one whole despite all of these individual parts. Attention is a style of information processing in which a brain focuses its resources on a limited set of interrelated signals. Awareness, in this theory, is a useful, simplified schema that represents intentional states. Modern psychology says , to be aware of X is explained by constructing a model of one's intentional focus on X. The mystical experience also corresponds to such cognative psychic moments, a breakthrough from a continuous stream of *vritti* or illusions. The Buddhist's Zen meditators tend ,therefore, to dwell on a subject unified mindfully to empty the preexisting psychic construct, restructuring oneself to perceive the reality in pure moments which is traditionally known as *satori.* In this context, theories of integrative function present solutions to two classic problems associated with consciousness: *differentiation* and *unity(or yoga).* They show how our conscious experience can discriminate between a virtually unlimited number of different possible scenes and details (differentiation) because it integrates those details from our sensory systems, while the integrative nature of consciousness in this view easily explains how our experience can seem unified as one whole despite all of these individual parts. Yoga in the traditional view point, some believe the unity of the psychic *ying-yang* factor for others it is the Divine reunion with God. Modern psychologist claim that there are some brain states in which sensory consciousness seems to be absent, including dreamless sleep, coma, and death. There are also a variety of circumstances that can change the relationship between the mind and the world in different ways, producing altered states of consciousness. Such experience can be attained while living during deep *samadhi* or at the moment of death when the structured sensory *skandha* breaks away . The death related phenomenon based on *Bardo Thodol* (the Tibetan Book of the Death) gives a systematic and vivid account of such altered consciousness in the intermediate realm at the moment of death and the after death dimension. The appearance of wrathful deities and peaceful deities reflect the continued projections of the sensory mental structures after the death of the brain. Mental flow and flux

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continue even after death is evident from the clinical researches of near death experience case studies as well as shamanism in the global context. The Tibetan ritual *mandala,* the effigy designed for a ritual *puja* along with the recitation of the *Bardo Thodol* text in the name of the deceased provide corrective aspiration, mental map for the safe navigation and guidance in the confusing intermediate realm that function by virtue of synchronized transitional cognizance born of the semiconscious mind of the deceased and the living also of the probable assistance of the deities and the laws of the intermediate realm.

In the *Upanasidic* perspective the witnessing aspect mind is considered crucial for the understanding of the working of the mental aggregates. *Jagrat,susupti and turia* states are understood in terms of the awakened (active),dormant (subconscious/unconscious) and the transcendental dimension of the mind. The Tibetan *Bardo Thodol* is similar to the *Preta Kalpa* of the *Garuda Purana* which is recited as an afterlife complementary ritual, the *antyasti samskar* in the Vedic tradition. In psychology, such afterlife dimensions are ignored but phenomenology largely has meant attempting to investigate consciousness using although superficial method of introspection, which means looking into one's own mind and reporting what one observes.

Fig.1 The organization of the lines show that only 'whole' perception has meaning.The lines do not change but their meaning change, therefore alter cognizance.

Fig.2 The horizontal parallel lines are equal .Yet, simple structures are capable of inducing illusion and therefore prove the illusionary nature of our general sensory perception .Sacred architecture aims at breaking away mental conditioning created by sensory illusion for clearer vision of the hidden dimension using similar but reversing techniques.

Fig.3 Schematic groundplan of a Nepalese Pagoda style temple (followed by axial cross section and front elevation)
Fig.4 The Uma Maheshwor image bearing archeological importance of the golden Licchavi period of Nepal left ignored at the roadside at Mahankal,Kathmandu.Here,the iconographic mirror shown by Goddess Uma denotes the quantum reflection of the self .

Under critical analysis modern science can be understood as the left brain approach to the investigation of the reality. The cultural approach of discerning the reality through cognizance by an adept participating within the sphere of sacred cosmology of art, architecture and esoteric iconographic symbols can be understood as the balanced right brain approach. When both the process is merged as one the resultant is *yoga* in the true sense. The Vedic tradition has stressed on this point of harmony.

In the global context, hexagram or the *Satakona* is widely accepted as the emblem of Judaism and given such names as Star of David, and Solomon's seal.The hexagram reached Judaism through medieval Jewish *Cabalist* who spoke of the desired reunion between God and his spouse *Shekina*. (a semitic verson of *Shakti).* The reunion is symbolized by a *mandala.* In alchemy it also meant spiritually intoxicant alcohol (fire-water). At Yucatan it meant symbol of Sun shedding its rays on earth. This context also seems to be linked to Egyptian symbol *'Ankh'* originating from the sun meaning spiritual power/authority. In such context we discover Vedic arts surviving pathetically as archeological remains in non functional forms scattered in the remains of the ancient civilizations of the world.

The Religious Arts and Symbolic Rituals in the Nepalese and Global Context

The ritual *bindu* put on the forehead of the deity in the shrine as an iconographic expression is the tradition that reflects the unified *prajna* (wisdom). Yoga, irrespective to what is understood these days, in fact is the *prajna(wisdom)* aroused as a consequent functional unity of the two different hemispheres of the brain. The Buddhist perspective, as according to the *Prajnaparamita,* is the insightful penetration into the reality of mind and furthermore seeing the *Buddha nature* in all sentient beings. This dynamic moment of cognizance in-between mind and matter, arouse the first seed of consciousness. Prolonged mindful breathing session based on correct method of pranayama at the subtle level also give rise to such transcendental experience .The south east Asian art, architecture and iconographic images were originally visualized by the siddha and were later crafted to invoke such state of *prajna,* the mystical unfolding of the sub conscious mind towards transcendental realization invoking corrective,realistic cognizance unlike the western appeal focused specially in the aesthetics.

Apart from temples, palaces, cities even ordinary traditional houses were planned in a specific *mandala* based on sacred architecture to enhance the participant within the structure with psycho-cosmic influence to induce cognizance of the higher dimension. Such structures are designed corresponding to the psychic construct of human being so as to break down preconditioned psychic barrier that usually tend to limit the understanding and the experience of transcendence within a defined sphere . Sacred Geometry is important in spiritual art as mathematics is to material science. The shapes and form together with ritual space seem to affect the energy pattern alike numbers that become tangible reality for mathematics, matter and material function in the conceivable environment. Since energy is comparatively subtler than the material dimension, the corresponding interrelationship between mind and energy being coherently strong, the resultant perception thereby induce experiential consciousness that sink deep down into the sub conscious realm of the mind. The functional law of Golden ratio would find the most appropriate explanation in this context how information could flow into the deep psychic realm through sense doors and somatic channels.

In Nepal, the temple architecture especially the pagoda style incorporates the cosmological plan of the five elements(corresponding to the sensory reality) accommodating corresponding deities, mythological figures, yogic chakras, structured fundamentally with the laws:the point , triangle above the square. The triangular multiple tiered roof-form architecture with a pointed

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and tapering pinnacle marks the union (or *bindu)* as in the *Satakona* signifying wisdom. The pointed crowns on the head of deities denotes the *sahasrara* chakra fully aroused through consistent one pointed *samadhi,sadhana,worship* or devotion.Herein is realized the serpent power, the *Kundalini Shakti*, denoted by out spread wings as the final enlightenment producing an expanding cosmology.This symbol Caduceus universally used as the logo in modern medical science is originally the *nadi (ida, pingala, susumna)* born of yogic philosophy which has also found respect in the ancient Roman mythology as *the staff of Hermes.* In the later time as the symbols linked to introspective science became misinterpreted, the science of materialistic alchemy gradually replaced the mystic tradition in Europe and consequently modern chemistry evolved.

Fortunately, art and architecture has survived in the south east Asian region although in vestigial form. Observing a typical Newar Buddhist and Hindu typology in the Kathmandu valley David N. Gellner opines, this as : a distinct awareness between exoteric (*bahya)* and exoteric *(guhya).*The Vedic perspective of architecture is essentially designed to induce transcendental cognizance in the deep psychic realm of the participant. Such inherent harmony is realized psycho-spiritually while the experience of the participant is also dependent on the functional influence of the five primal elements as:

Table. 1 *The fundamental features incorporated in the sacred Vedic Art and Architecture.*

Elements	Color	sensory organ	symbol/form	cognizance (of 5 elements)
Tejas (fire)	red	eye	equilateral triangle	sight(rupa)
Apas (water)	silver	tongue	crescent	taste(rasa)
Vayu (air)	blue	skin	circle	sensation (sparsha)
Prithvi(earth)	yellow	nose	square	smell(gandha)
Akasha(sky/spirit)	indigo	ear	oval	sound(sabdha)

In the yogic perspective sensory perception and the corresponding elements(also bearing the attributes of the respective deities) seems to link in a defined sequence .The Vedic iconographic symbols follow a defined set of mathematics and geometrical recognition to the respective five primal elements and their corresponding influence by virtue of the flow of information through the sensory channels, thereby creating transcendental influence through altered psychic cognizance.

The consciousness thus arisen awaken the smooth flow of energy along the meridians (channels) thereby producing the transcendental experience which in turn alter even the nature of neurotransmitters at the somatic level.The inner realm of somatic bodies is explained as *kosha* or sheaths in the Vedic tradition alike the Buddhist which stresses on *trikaya-* the *dharmakaya*, the *sambhogakaya* and the *nirmankaya*, the inner and subtler architecture where light essence is known to dominate over the material (somatic structure).The existence of light essence in life including in plants is proved by Kirlian photography justifies the existence of subtle architecture even if the somatic architecture is broken down. The sacred geometry harbors all five subtle aggregates as the iconographic features of sculptures to symbolically express the liberating cognizance. They were originally meant to be used as a tool to visually cognize the wisdom of the path to achieve the transcendental experience by the neophyte (adept).The two thousand years of destruction and damnation of image worship has caused untold devastation of these sacred science of the '*old world*' firstly due to the crusading movement against the prevailing pagan culture (having Vedic links) and secondly due to the emerging new secular science blindly focused in industrial and materialistic development needs issues only.

The Greeks and Romans based many of their traditions on the religions of the pharaohs. The cult of Isis, for example was celebrated throughout the Roman Expire as were those of Osiris and Anubis which resembled in some ways the Vedic Gods and Goddesses. The laws relating to the structure of the pyramids contain the elements of temple architecture which in fact were designed based on *Vaastu Shastra*.The Greek gods resembled the Egyptian gods whose major iconographic affinity had links beyond the Indus Valley Civilization, the Vedic pantheism. In the *Uma Maheshvara* images of the Nepalese Lichhavi period, the iconographic forms of Vedic Goddesses *Uma* with a mirror on her hand inspires the *sadhakas* to see within the oneself ,not the outer world for the search of ultimate reality , *maya* being illusionary, nature is merely pointing at the reflection of the ultimate (quantum) reality. Jean Senzec notes that the spirituality of the early Christianity was linked to the Asiatic stellar gods and the science of zodiac wherein the heliocentric faith from Egyptian culture imported from south Asia predominated the later traditions. The much later quest for the Holy Grail and the rise of the Knight Templers and the consequent crusade suggest that the original answer regarding divinity lied in securing and protecting a mysterious code contained in the holy *Grail.* In fact, the *Grail* was the symbolic metaphor wherein contained the elixir of the divine consciousness, the seventh c*hakra*.Modern nuclear physics has once again made the transmutation of metals theoretically possible -by methods altogether different. The later quest for the secrets of the transmutation of metals and the Philosopher's stone stimulated all kinds of scientific progress. Roger Bacon, who devoted ten years to alchemical studies, came to understand the importance of experimental science neglected by most contemporaries and in course of integrating its results with the doctrines of his predecessors developed the study of mathematics as the key to understanding natural phenomena. As a result of Bacon's interest in alchemy the study of mathematical physics flourished in turn at Oxford, Paris, Padua and Pisa laying the basis for the work of Galileo and Newton.

Being the domain of the deities and invisible spirits the sanctity of the shrine is known to increase manifold. Dr. Joseph murphy notes - *on every continent in every land there are shrines at which cures take place. Whether celebrated or obscure the healings that happen at these shrines happen for the same reasons as by way of the same power of the sub conscious mind.* To understand cognizance the understanding of

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cerebral function is also important. The cognitive ability of the brain is astonishingly great but only when the subconscious mind is activated. The theoretical connection pattern of the brain is 40 quadrillion 40,000,000,000,000,000. Factorized in the variable power of how strongly neurotransmitters send a signal from one neuron to next, hypothesizing that each neuron has ten different signal strengths, then the number of electrochemical configurations in the brain runs to ten to the one trillionth power. That's the number, followed by a trillion zeros. This compared to the number of atoms in the observable universe: 10 to the 80th power. Out of this mind-blowing vast maze of neutral connections of varying intensities comes the ability to comprehend and interact with the universe. At some point in the brain's development consciousness arises within a three-pound tofu- like mass of wrinkled architecture. The universe becomes aware of itself and can marvel at its own complexity.

Such relation between the subconscious mind and the macrocosm is what ancient sacred architectures have attempted to correlate. In the Nepalese styled Pagoda temples the entrance door contain the *torana* (tympanum) carving's with various divine supernatural beings such as the *Garuda, Nagas* and *Makara*.They are depicted being in interconnection, meaning the connectivity of the sky, earth and water elements . The presiding central deity symbolizes the origination of the related cosmology. This unified synchrony based on the *ying - yang* principle is denoted by the two sides of the door panel with central *chhepu* meaning dissolution of the *ego/skanda* to surrender before the main shrine inside the womb, *garbhagriha* of the temple. Vertically the central deity corresponds to the point (singularity) of the pinnacle (*gajur*)to indicate unity in differentiation. The four armed deity exhibit each pair of arms corresponding to the masculine and the feminine force in the anthropomorphic form .The deities' *Merudanda* are aligned to the axial position of the temple *mandala*.From the point of the pinnacle to the expansion down to the ground mandala of the temple cosmology reflect the expanding nature of the singular consciousness corresponding to the expansion of the physical universe(s). The *Bhubanapradipa* the *Silpa Prakasa* and many other traditional treatises on temple architecture is consulted for Temple construction. (Rgveda X.90)mentions of the cosmic *purusa* from where all things were formed.The Upanisads make *Brahman* and *atman* as the two world grounds, not different and separate, but aspects of the same great being .The Chandogya Upanisad (7.12) makes a more serious attempt to conceive space.The Upanisadic sages were the first to grasp the stupendous idea of space as Brahman (*Brh*= to expand),the expanding universe.On the contrary, the reptilian floor plan dedicated to the sacred *Nagas* that dwell underground is represented by the *Nagabhandha* which explains the coherent binding (nuclear, gravitational) force for stability, sanctity and protection as the corresponding nuclear and other forces in the nature. Furthermore, mythological creatures such as *gandarvas kinnaras, chheppu, aphsaras,yaksha-yakshani,surabha* etc form the consciousness of the corresponding realm. The knowledge of existence of the different *lokas* is apparently noticeable in the ancient architecture. Through sacred art and architecture Vedic spirituality has its own reason in placing spirituality at the center where physical world become the secondary reflective locus of this dynamism. Without the integrity of consciousness of the visible -invisible realm the knowledge of the sphere of total consciousness could never be complete. Therefore there is ample space for the Scientific integrity of sacred geometry to explore the holistic world view based on psycho-spiritual cosmology.

In the global context, hexagram or the *Satakona* is widely accepted as the emblem of Judaism and given such names as Star of David, and Solomon's seal, The hexagram reached Judaism through medieval Jewish *Cabalist* who spoke of the desired reunion between God and his spouse *Shekina*. (a semitic verson of *Shakti)*. The reunion is symbolized by a *mandala.* In alchemy it also meant spiritually intoxicant alcohol (fire-water). At Yucatan it meant symbol of Sun shedding its rays on earth. This context also seems to be linked to Egyptian symbol *'Ankh'* originating from the sun meaning spiritual power/authority. In such context we discover Vedic art surviving as archeological remains in non functional forms scattered or buried in the ruins of the ancient civilizations of the world.

Art and color science,the East-West perspective

Shivashakti as the measure of all things in the microcosmic level

The European renaissance art contain many elements of Vedic philosophy and science.Not different from the eastern art, Leonardo's famous drawing, Vitruvian Man (c.1487), Illustrates a classical formula devised by Vitruvius. It is simply explained by the mathematician Luca Pacioli, who often worked with Leonardo: *"Having considered the right arrangement of the human body, the ancients proportioned all their work, particularly the temples, in accordance with it. In the human body they discovered the two main figures without which it is impossible to achieve anything, namely the perfect circle and square.* " The microscopic man was contained in the basic magic pentagram as a favorite symbol among the mediaeval alchemists and philosophers. It was considered an illustration of the theological principal *'as above ,so below'* the *ying-yang(shiva shakti)* or the left-right cerebrum of the brain function in the biological perspective. In Leonardo's drawing the man fits into a circle: with feet together and arms outstretched, he fits into a square. Such element had already been employed in the ancient sacred Vedic art in the form the *Satakona*. Here,the microcosmic man is the *Vaastu Purusa* in *Shiva Shakti* form. The European renaissance art took almost two thousand years of massive destructive phase to finally acknowledge the Vedic reflections found in the pre-Christian pagan remains of ancient Roman art and architecture in the form of renaissance.

The sensory understanding of the visible spectrum

The West is now coming in closer understanding of the subtler realities as mentioned in the Vedas . In 1879, the American artist and color scientist Ogden Rood Proposed that identical optical effect "*take place when different colors are placed side by side in lines or dots, and then viewed at such a distance that the blending is more or less accomplished by the eye"*. This passage had an enormous influence on Seurat, who began to juxtapose dots (French: "points") of bright color after 1982, systematically creating a technique that became known as "pointillism" or "divisionism". In the Nepalese Vedic cultural ritual the *tika* marked on the occasion of *Bhaitika* consists of seven colors on white base justifies the Vedic evidence of color mixing and divisionism a gesture of ritual auspiciousness symbolizing the seven spectral frequency of the soul known to be transcendentally cognized through contemplation as a silver spark with all radiating aura around. It is this aura field cognized by the ancient seers with the divine eyes and consequently a tradition in

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painting followed marking glowing light(halo) around the *mukhamandala* of the deity. In the sculptured ancient sun god images seven horses denote seven color spectrum. Such evidences reveal scientific wisdom beyond the confines of the stones, realized by the *rhisis* much earlier than today's scientists. Similarly, the existence of light essence in life including in plants is proved by today's Kirlian photography. The original shape of a torn healthy leaf when photographed (within certain time limit)is known to reveal a full shaped leaf in the form of light.This proves the existence of subtle architecture of a different dimension even if the somatic architecture is broken down.

Conclusion

In the above perspective anticipation of renaissance in divine Vedic art and science would add profound meaning, the in-depth scientific study in the spiritual perspective. As the esoteric artistic, architectural and iconographic codes found across the continents were aimed and meant for spiritual enlightenment, the systematic exploration and global appeal for bringing back the wisdom of the *'old world'* (ancient civilizations) would immensely contribute to the liberation of modern science from its reductionist approach, towards a holistic, meaningful and enlightening scientific quest for the true benefit of the mankind.

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Towards Synthesis of Science, Philosophy and Spirituality - Dialogue the way

(Glimpses from Dr. T.D. Singh's contribution)

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ABSTRACT

The important philosophical traditions of India like the Vedanta and Sankhya acknowledged the two broad realms of existence namely, phenomenal appearance and noumenal reality which facilitated evolutionary and purposeful living. Hence it is observed that several renowned sages, seers, thought leaders in the past and present are not in favor of any exclusivist position which confines to subscribing to one

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domain. But unfortunately around the 16th and 17th century in the west especially in the European world, the conflict began between science and religion and later Darwinian's evolution theory further widened the gap and subsequently down the timeline neo-Darwinism has impacted the modern science and general populace world view thus making materialism the mainstay for human civilization with consequential implications. Interestingly in the recent times, especially in the 21st century, in midst of the conflict many eminent scholars from different parts of the world are actively engaged in Science and Spirituality dialogue to address genuine and pertinent issues arising out of materialism.

Dr. T.D. Singh, (His Holiness Bhaktisvarupa Damodara Swami), a legend and one of the foremost pillars of science-spirituality dialogue of the 21st century, envisioned that the 'New Science' that will emerge from a synthesis of science, philosophy and spirituality will have a unique potential to address plaguing issues pertaining to origin of life, universe, ethics, ecology, education, philosophy, religion, science, societal and others. To this end, for more than two decades he facilitated platforms and initiated dialogues, discussions and interviews with the best minds of science and spiritual traditions which included Nobel Laureates in science and peace.

In this paper the author shall briefly discuss and analyse some of these discussions and examine how a first class dialogue can facilitate a synthesis through commonalities which in turn can provide guidelines and pointers to address some of the major concerns of materialism.

1. INTRODUCTION

The ancient wisdom Bhagavat Gita (v 7.4-6) confirms about the existence of matter and spirit and their interactions.

"Earth, water, fire, air, ether, mind, intelligence and false ego—all together these eight constitute My separated material energies. Besides these, O mighty-armed Arjuna, there is another, superior energy of Mine, which comprises the living entities who are exploiting the resources of this material, inferior nature. All created beings have their source in these two natures...." [1]

And also as per Vedanta we are more than a physical entity, having three bodies with both physical and non-physical including spiritual aspects co-existing together and so accordingly these two broad domains, science and spirituality constitute the vital interacting fields for human activities. So it is not strange that Science and spirituality are accepted as the two most dominating forces influencing human enterprises and the latter in fact, provides the necessary platform for the domains to relate with one another irrespective of the conflict that is presumed to exist between these fields at scholastic level. In this context, a scientific mindset like openness which is common to both scientific and spiritual cultures can help to identify and acknowledge the commonalties between the domains and nurture a cooperative partnership to address pertinent concerns of human civilization.

At an event in Austria, during late summer of 1983, physicist Fritjof Capra, biologists Francisco Varela, Rupert Sheldrake and spiritual leaders such as His Holiness the Dalai Lama and Zen master Baker Roshi and many others arrived at a conclusion that spirituality without science tends to be self-obsessed and weak. Further, science without spirituality was mechanistic and inhuman, they concluded. Hence they opined that a fusion of the beauty of science and the blissful nature of spirituality is the need of hour.[2] Subsequently in the following decades, dialogue grew between scientific researchers and those with a spiritual vision for a better world.

In this regard, Dr. T.D. Singh very much appreciated the advancement of natural sciences and he was inspired that the increasing knowledge in natural sciences has moved it closer to mysticism thereby acknowledging the existence of inexplicable or *acintya*(sanskrit) and increasing the theistic interpretation of empirical observations facilitated through a first class dialogue between science and religion. He thus asserted that common dialogue is essential, it is an important principle; through which there is willingness to listen to each other so that we can primarily arrive at some common solution to help mankind.

Also, in the past, Swami Ranganathananda, one of the pillars of science and religion interface in the 20th century from the Advaita Vedanta School has affirmed how the non-dialectic interconnectedness between modern science and spirituality has helped scientists to approach the unknown with humility. 'Science in the modern age has lengthened man's intellectual tether, but this has only helped to bring into sharper focus the mystery of the unknown and the significance of the para vidya (higher knowledge or wisdom) of which the upanishads speak'. He adds, this reality of interconnectedness where a deeper journey in science points towards unknown has helped several scientists during recent decades to approach the unknown with humility and reverence surpassing the limits and rational temperament of physical sciences.[3]

Nobel Laureate George Olah also sends an important message to scientific community that with all humility they admit man's limitations and hence limitation of their knowledge. He asserts that though scientific knowledge will continue to expand, but only upto a limit as it hardly can be expected to give answers to many of the fundamental questions like the origin and meaning of the universe, life, our being as intelligent species and the understanding of the universal laws governing the physical and biological world of mankind. And he accepts this without doubt.[4]

So considering the limitations of modern science in comprehending reality in totality, Dr. T.D. Singh rightly opined that Science and religion has to be studied together. As

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the primary field of study of Science is about matter and primary field of study of religion is about science of life or real life - the spark, which cannot be comprehended by modern science; he affirmed that together they give whole knowledge especially related to matter and spirit.

He further observed that sadly, the mechanistic paradigm had dominated man's culture in both scientific and philosophical spheres since 17th century which explains everything in terms of atoms and molecules. However, he feared that this paradigm has limitation to address morality, life's meaning and purpose, consciousness, mind body interaction etc. So he felt it was imperative that a new paradigm or new science is developed that will incorporate the spiritual dimensions of life and will thus be able to explain the higher realms such as consciousness, ethics, meaning of life etc. In this regard he was optimistic that synthesis of science and religion will provide the necessary framework for a new paradigm. He admits that in science there is lot of important works but the religious tradition is also required for the upliftment of the quality of life, he asserts. He said, Science generally deals with the material principles and physical laws whereas spiritual knowledge deals with acknowledging existence of God and His creation of this world, hence the paradigm which incorporates the above mentioned two principles will be able to explain all dimensions of nature and life. Therefore, he asserted that it is important that these two fields, that is science and religion must interact such that if they can be brought together in the service of humanity, in the service of life, then many things can be resolved.

In view of promoting a new science or a new paradigm, Dr. T.D. Singh engaged deeply with great minds comprising Nobel Laureates, important scientists and well-known religious leaders, peace leaders and this was his important occupation which he continued till the end.

2. DIALOGUE THE WAY

By and large Dr. T.D. Singh had emphasized that the close connection between science and spirituality or apara and para is still not widely known among general intellectual population and so they struggle to find a viable solution for plaguing issues of society. It was his earnest desire that the intellectuals of society from different walks of life keep aside their ideological or other differences and focusing on common welfare of mankind come together to discuss the utility of their intellectual knowhow and other accomplishments for the purpose of peace and betterment of entire humanity.

He demonstrated that to move towards bridging opposing thoughts or groups or sections of society, first class Dialogue was the only way. At this juncture it would be good to be familiar with different kinds of dialogue as enunciated by the great seers like Srila Bhaktivinoda Thakura[5,6] from Sri Chaitanya School of thoughts.

They are:

1. First Class Dialogue in which one is interested in understanding others as there is love and respect for others. There is eagerness to arrive at commonalities for the benefit of mankind.
2. Second Class Dialogue where both are interested in being heard but there is no respect and so there is no common purpose of dialogue. Nothing concrete is achieved in the process.
3. Third Class Dialogue in which one is interested to put other down as there is no interest in hearing other. It facilitates antagonizing between groups/individuals engaged in dialogue.

A first class dialogue with openness helps to reconcile or keep aside differences whenever it arises and there is also learning and transformation in the process. Dr. T.D. Singh during his life time thus engaged in first class dialogue with many top brains in the field of science and spirituality. As an example, inspired by Dr. T.D. Singh's work and interest, Prof. Alan G. MacDiarmid who was a renowned Nobel Laureate in Chemistry confessed during his interaction that he was willing to discuss the subject matter of synthesis with Dr. Singh in the midst of his tight schedule as he believed that through such interactions, one can learn a lot and it expands the intellect.[7]

Due to size limitations, in this paper, we have made humble efforts to examine only some of the key dialogues focused on synthesizing science and religion to discuss some pertinent problems in these fields.

3. SYNTHESIS OF SCIENCE AND SPIRITUALITY

3.1 Dialogue with Prof. Charles Townes, Nobel Laureate in Physics[8]

While Dr. T.D. Singh opened up the discussions about the relation between Science and Religion as understood in general amongst intellectuals and others, Prof. Townes refuted the presumed larger difference and asserted that both are more similar. He considered them parallel and connected. He observed that both have the same goal to understand universe and life, but that they use different techniques and approaches. He asserted "If the universe has a meaning and a purpose, this must be reflected in its structure, functioning and, hence, to science....In addition, to best understand either science or religion, we must use all of our human resources - logic, evidence (observations or experiment), carefully chosen assumptions, intuition, and faith."[8c]

He thus opined that Science and Religion must converge. Instead of separating science and religion, he considered the scientific exploration of the universe as part of religious experience and identified the following striking commonalities between them.

(1) Faith in both scientific and spiritual endeavours
(2) Revelations/Inspirations in scientific discoveries similar to revelations in spiritual traditions. Here he recounts his own experience in the invention of the laser and the maser

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and how inspiration came to him suddenly and he attributes it to God.

(3) Use of logic but there is no absolute proof in both scientific (Godel's theorem confirms this) and spiritual disciplines.

(4) Both are pursuits of truth.

(5) There are differences (of opinions) in spiritual traditions, so there are differences (of opinions) among scientists also.

3.1.1 Epistemological issues and limitations of science

Prof. Charles Townes admits on the changing nature of science and in particular he highlights that on exploring more deeply, physicists have often found that they had to change their basic ideas. In this regard, he further admits that there are many inconsistencies in science and by no means have the scientists understood all the laws of life and the universe. Besides, it is not so simple to define life and consciousness, he asserts. On biologists, he observed that presently they are working at mechanistic level involving actions of atoms and molecules to study living organisms and so it will be difficult to understand varied life process. But he felt, with better understanding of living organisms, science might be different, change basic ideas and then biologists may be encouraged to take a different point of view indicating not necessarily from prevailing biology dogma. Elaborating further, as a physicist, he agrees that on examining the physical universe, it will be found that in many ways a very narrow and special combination has made possible the existence of this universe, the earth, and various life forms. He says, there are eighteen different constants that define the existence of this universe and make the existence of life forms possible and that one cannot comprehend why they are as they are. So, he believes that ours is a very special universe, very intelligently planned.

But Dr. T.D. Singh expresses concern that if physical sciences are ephemeral then without having complete scientific proof how could top biologists like Crick and Watson make assertions regarding life and its origin? As a result he says, all college and university textbooks in these subjects give one sided view about life based on mechanistic paradigm and a wrong message is transmitted to the younger generations of scientists and the public at large, and this is significantly but indirectly contributing to ignore the higher purpose of life.

Prof. Townes admits that though he presents this view from physical sciences, but he believes that the biological sciences have not come up to this point. He says biologists are in the realm of "this is natural" but, he asserts there is indeed a Creator irrespective of being refuted by biologist. He admits, this may not be included in the domain of science, but then he says, even free will cannot be understood by present science although we have it.

So Dr. T.D. Singh asks if physical science will change biological science and lead the latter towards spiritual quest, to which Prof. Townes agrees and says it is so because physical science is more fundamental and in physics one runs into very deep puzzles to recognize the truth that we don't understand everything.

As Prof. Townes admitted that the exploration of universe is indeed a religious experience and that our universe is very special and unique, the fundamental constants have been empirically observed and thus many in scientific communities including him admit that our universe is fine-tuned and so spiritual elements can be incorporated in scientific research. So in this regard, Dr. Singh wanted to know if conclusions are moving towards theistic interpretation of empirical observation. Further he was also interested to know about Prof. Townes' conception of God from scientific perspective, because, 'God' is often unclear when discussed in the context of science and religion dialogue or with reference to empirical exploration of the universe.

In response, Prof. Charles Townes agreed that it is highly improbable that the creation of universe is random and so there is all possibility that it was planned by a fantastic intelligence who can be called 'God'. But he also accepted that there are people in the community who may not accept this view as they may think, there may be an infinite number of universes, all having different laws of physics, and that the only one that happened to turn out right is our universe. And so they believe because this was the only one that turned out right, so we are here. But then he remarked, this is also an imagination since we cannot do any scientific testing to find out if they are there. Also he admitted that there is no scientific answer to the question that why is it that the laws of physics would change from one universe to another. All in all he acknowledged that there are many things we don't understand, like there are forces in nature within our universe that we don't understand and so we have to accept the idea that they are probably there. We can feel and sense them, but we cannot understand them, he said.

As Dr. Singh was keener to know on the progress of research connected to study of life and origin, Prof. Townes confessed that from the traditional scientific viewpoint they have no idea what the probability of life is. He opined, because all species on earth are related, we can be pretty sure that it happened only once on earth. He also shared his observations where some scientists say, it is all chemistry, or it is the chemicals that come together. But here he pointed out that still they have come together in a very special way, and we don't know the probability of that. Besides, he acknowledged, consciousness still remains a big issue. If molecules are thought as materialistic things, then what consciousness is, he questions. He admitted that scientists do have difficulty even in defining consciousness, or the conscious being. So he accepted that there may be other forces involved outside of what our science presently knows and it can be spiritual forces or other forces. And this could be possible he believed, because at present in physics, scientists are finding more and more unknown things which they recognized to exist. As an example he said most of the matter of our universe is not

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visible to us though we know it exists. As a matter of fact we can see and detect only five percent of the matter in our universe and don't know what the rest is, he admits. He thus confirmed that we are finding new forces in our universe and so there is no reason to not believe that that there could be additional forces present.

In this regard, Dr. Singh enlightened further that if life happened only once and the conditions then were rightly formed from the beginning and if life is viewed as a spiritual force or other forces that was always present, which we cannot detect, then this could be in harmony with the theistic conception, where God is accepted as the source of both the material energy, or force, and life. To which Prof Townes agreed saying that's quite correct and emphasized again that Science is an effort to understand how the universe works where scientists try hard and hope that they can find out more and more. But in the process, he admitted that scientists must also recognize that there is much they don't understand, and they must accept that. Hence he believed there is no long-range question more important than the purpose and meaning of our lives and of the universe. And so he affirmed that we should ponder more on the basic questions like what is the nature of life? What does it mean? and so on, and take them very seriously, and they are the questions religion attempts to answer.

He therefore felt that it is important for fields like life-sciences to understand subjects like consciousness, free will and ethical values as gradually, some biologists are recognizing that they don't understand the puzzling nature and uniqueness of human life, free will and consciousness. Hence he strongly believed that as scientists study the nature of free will they will face more and more of these deep puzzles and in the process will begin to recognize that things are not merely mechanistic and that the presence of various forms of life on earth are very special and thereby recognize that it is not just causal actions based on molecular interactions as claimed by biologists.

3.1.2 Materialistic Paradigm of science

While acknowledging that science and scientists have contributed generously towards the welfare of humanity and must continue in this direction, Dr. T.D. Singh raised a pertinent concern about members of the scientific community who adopt materialistic paradigm. He wondered if they are directly or indirectly contributing to the deterioration of values in human society or if the one-sided reductionist approach is indirectly causing harm to society.

Prof. Charles Townes responded that as such the true spirit of science is the search for truth and also to discover the unseen laws of nature, so it is not necessarily materialistic. He affirms that the understanding of the universe is somewhat parallel to understanding of our relation with the creator and so in this search for truth; it will be certainly beneficial if scientist can incorporate spiritual principles in their scientific works. In this context he further expressed that education has an important role to play here. He opined that courses in moral philosophy including civilization and its meaning and meaning of science are valuable at all level, high schools, colleges or universities and they can be taught openly. But importantly he says, teachers also should have a moral sense. So a broad education according to him must deal with philosophy, religion and ethics and help students to think about the meaning of life, of civilization, and of mankind's role in this cosmos. Quoting the example of philosophical research, he said unfortunately the education gives emphasis to mathematical logic, though important but it doesn't guide students on what he is living for. So especially from the Indian context he opined, India should develop both scientific and spiritual culture. He was also of the opinion that normally people who study science are thoughtful about life and values, hence both cannot be separated. He advices students that they must value and appreciate their religious culture, especially the classical Indian culture he believes has significant bearing on meaning of life and values. So to separate science and Indian culture could be harmful, as it would produce a dichotomy of choice to go either this way or that way he stated. Thus he asserted that it is not practical to keep scientific and spiritual cultures separate.

3.2 More Dialogue on Consciousness and Evolution[8d]

While interacting with Dr. T.D. Singh, Werner Arber Nobel Laureate in Medicine and physiology confessed that how impressed he was to hear about 8.4 million species. He said scientifically they yet could not come up with the figure. But he accepted it is in that order (microbes to human) and they are correct. But the consciousness which evolves through different life forms and ends up in human as per Vedantic view, this is not available in scientific evolution, so it surprises him, though he acknowledges that the claim cannot be wrong and he was ready to consider it as a possibility.[9]

"Certainly these philosophical aspects of life are worthy to be considered, but appear to be inaccessible by today's science."[10]

Further he also thinks that life could be beyond the assembly of bio-molecules.[11]

It is thus observed that in an open-minded discussion on the ontology of life, Werner Arber was indeed impressed about Vedanta view. So though 'Natural Selection' is superficially seen as part of Darwin's mechanistic model but factually a re-examination of 'Natural Selection' can shed new insights on inexplicable phenomena as it points towards non-mechanistic realm because nature exhibits its intelligence during selection.

Thus Werner Arber opines that "Evolution does not occur on the basis of errors, accidents or action of selfish genetic elements. Rather, the evolution genes must have been fine-tuned for their functions to provide and to replenish a wide diversity of life forms..."[12]

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"As I had already outlined, our human projection to render a divine force responsible for the natural beauties and enormous diversities is a matter of definition for the term divinity... It can appear to us as a divine intention, rather than as a precise plan or a strict program."[13]

Further in their dialogue, Werner Arber also affirms in the context of his field, microbial genetics and evolution that he gave some thoughts on spirituality and came to conclusion that we should not continue to be in opposite positions. He acknowledged that there is so much common between them and so scientists must look for common ground. So in this spirit, in his scientific investigations he searches for the best interpretation of available data from experiments and observations and look for all possibility to connect it with traditional wisdom like Genesis.[14]

In the same vein, regarding deeper aspects of reality, Sir Roger Penrose in his dialogue with Dr. T.D. Singh, acknowledges their existence and has admitted that beauty, morality, truth in its purest form etc. are fundamentally connected to the Platonic worldview and he accept this world view.[15]

Dr. T.D. Singh in his open conversations with Sir Roger Penrose expressed about Vedantic view point on consciousness based on non-physical ontology of life.

Sir Roger Penrose welcomed it in positive note and admitted, "Our present scientific knowledge cannot describe consciousness. On the other hand, the boundaries of what we call as scientific are not fixed on this view. To me, scientific means clearer and rigorous thinking in a sense....we certainly don't believe that consciousness can be understood in terms of present science".[16]

Further Sir Penrose expressed that consciousness is essential for understanding and so without consciousness, there is no question of understanding. For example, he says a computer as per his opinion has no consciousness and so it does not have the understanding. He says that one can tune computer or make it play chess very well but then here the understanding comes from the person who programmed the machine. He asserts that computers can certainly do wonderful things, but what they cannot do is to understand or experience what they are doing and so consciousness is not a computer, but it is something else. He opines that Consciousness also has other roles where it is responsible for the feeling of pain and so on. Also he believes that consciousness is not purely for only a human being, but something which goes far down the animal kingdom, but I do not know how far down.[17]

He thus admits that he is not aware about the varied degree of consciousness that exists across different living organisms because consciousness cannot be understood in terms of present day science.

So he agrees with the view of Vedanta that all living organisms possess consciousness and that modern science due to its limitations cannot comprehend this aspect. This amount to admitting that physical sciences are incomplete with regard to the knowledge of phenomenal world or physical world because of the existence of consciousness. As a true scientist, Penrose exhibits openness to look into other ways in understanding consciousness.

In this context the Vedanta presents detailed information about the degree of consciousness. It is given in Padma Purana that there are 8,400,000 forms of life and the evolution is the journey of innumerable conscious particles of life or soul. It states there are 900,000 forms of life in the water, and 2,000,000 forms of trees and other plants and 1,100,000 species of insects and reptiles, and 1,000,000 species of birds. Finally, there are 3,000,000 varieties of beasts and 400,000 human species.[18]

The Washington post dated august 23, 2011 also confirmed that as per a study there are 8.7 million species on earth.[19]

Also as per Vedanta the external body or physical-biological form factually represents different degree of consciousness or different degrees of consciousness are expressed through these different bodies. There are five broad categories of consciousness. They are acchadita (covered), sankucita (shrunken), mukulita (budding), vikasita(blooming) and purnavikasita(fully bloomed.) And they do restrict or impose certain limitation in the development of consciousness. Like for the human body, there is no restriction and the consciousness can be fully developed, but this is not the case with other biological forms.[20]

Tree, plants are not developed, but they do have consciousness. They are more or less alert relatively. So they have limited consciousness and thus categorized as covered. A few decades back, Sir Jagadish Chandra Bose conducted an experiment to prove that trees and plants have life and that plants could also experience different sensations like us.[21]

Similarly other living beings like worms, insects, animals also have 'shrunken consciousness', not covered like plants, but not as developed like human beings who have 'budding consciousness'. Animals like cows were studied to know their feelings based on personal touch.

"Just like people respond better to the personal touch, cows also feel happier and more relaxed if they are given a bit more one-to-one attention," explained Catherine Douglas, from the Newcastle School of Agriculture, Food and Rural Development.[22]

"In the mind of monkey we see traces of primitive scientific responses. They are slightly able to analyze consequences and possess a sense of gratitude to a minute degree."[23]

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Thus human beings have the potential to fully develop their consciousness like a bud blooms to flower, while other living organisms do not have this facility confirms Vedanta. Hence Vedanta asserts that the facility and capability to inquire into Absolute Truth or Brahman or *atatah brahma jijnasa* is possible only in human body. So examining beyond physical realm and investigating into the nature of consciousness or nature of soul using scientific temper are some of the amazing achievements of Vedanta schools. But on the other hand, physical sciences with all their deep rigourous thinking like that found in Mathematics cannot describe consciousness. So sages and seers of ancient times through scientific meditative investigation could realize they are conscious beings. In this regard Dr. T.D. Singh informs Sir Penrose that they are involved in rigorous spiritual disciplines to experience that consciousness is a property of life.

To which Sir Roger Penrose rightly expresses, "I am sure there is lot to learn from other ways of looking at what consciousness is. But for myself, I would like to see how it fits in with the behavior of physical world. I think there are interesting issues there which tell us that the behavior of the physical world that we know from present day science is incomplete.... Another reason for incompleteness is because of the existence of consciousness and there is no room for it in the physical theories we know. QM doesn't have a place for it."[24]

Prof. George Ellis in his dialogue with Dr. T.D. Singh also concurs that physical science has not solved the problem of consciousness. He says, it doesn't even have a start in solving it. Science has all the intricate information about the working of brain, about its neurons, how they are connected and which are the regions of brain that are important for speech, sight etc and all mechanisms. But we do not have any concept of how we see or hear or feel, admits Professor Ellis. He thus confesses, the major problem on consciousness is completely unsolved. It may be beyond science or may be within, he is not sure. But then he quickly admits on one side physics cannot explain consciousness, on other side without consciousness it remains incomplete and so it opens up the way that it could be beyond science.[25]

Interestingly, Prof. Karl Pribram in his discussions with Dr. T.D. Singh goes a step further and says consciousness is an aspect of spirit or the spirit is an aspect of consciousness, it is both ways. He also agrees with Indian Vedanta's Sankhya philosophy and states that though scientists like Francis Crick accepted consciousness can be explained mechanistically, but Crick also felt that probably material reductionism may not be the only way to study it.[26]

4. TO CONCLUDE

Openness is intrinsic to scientific mindset, and dialogue is naturally part of openness. On practical note, Dr. T.D. Singh states that there could be differences but eminent thought leaders have pondered over the common grounds like role of faith, inferring on inexplicable beyond empirical approach, origin of life, nature of consciousness and ethical challenges. He said, "This potential for misunderstanding humanity's relationship with nature and other form of life demands that scientific practices must be carefully examined and justified. Science should not be left alone. It is important for scientists to inquire into and understand fundamental issues of morality and ethics. If they do, Civilization will proceed in a synthetic direction. A proper understanding of life from both scientific and religious points of view will create an atmosphere of global harmony and will help immensely to ease the pervasive tension of fear caused by such pathological symptoms of our scientific age as unnecessary military research."[27]

All in all it does appear that an open-ended first class dialogue between thought leaders in the field of science and spirituality is a powerful tool for the domains to work together to deliberate about the science of life and also on many other common areas meant for the betterment of human civilization and for fulfilling the purpose of existence in relation with non-dual absolute truth.

Ultimately, every human enterprise is affected by these fields either separately or otherwise.

For instance the issue of consciousness is an important area to be deliberated from societal view point.

Take the example of marriage.
Artificial Intelligent expert David levy has predicted that human will marry robot by 2050 and that it will be legalized. He accepts that as "As the robots become more and more human-like, so people [will] come to accept them more and more... humanoid robots start to look and feel more like us."[28]

But Sir Roger Penrose and several great minds in past and present have clearly asserted that a computer can never become conscious.

Further Rob Merkel, general manager of oncology and genomics, IBM Watson Health, says, "AI can go wrong when an underlying assumption is made that it can replace human judgment."[29]

It is after all man-made algorithms that is guiding robots to display behavior while interacting with human[30], hence humans marrying robots would mean an unnatural marriage as against sacredness is being promoted between conscious and non-conscious entities which will adversely affect family and society structure because as per nature's law these structures are based on harmonious interrelationships between conscious entities(members) of family and society having consequential effect on sustenance of planet earth.

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There are also fears that when robots gets power over man based on its artificial intelligence and assumed consciousness that it possess it can indeed cause havoc to human civilization. The birth of killer robots is just a case. Recent news highlighted the birth of *killer robots* and several elite nations are at an advanced stage of its development. This has left UN seriously worried. One of the developing nations has rightly expressed out of concern that machines lack any compassion and intuitions to make life and death decisions and this can make war even more inhumane.[31]

In this age of science and technology where technology is growing so rapidly beyond the growth of human's maturity to discriminate technology's use and misuse and as Prof. Townes pointed out that like there are differences in spiritual traditions similarly there are differences amongst scientists too, then what is the purpose of pursuing science and spirituality using antagonistic approach at the cost of ruining human civilization? If plaguing issues of mankind is not addressed and if human enterprises cannot advance mankind towards his real destination, then how can human civilization flourish or sustain itself?

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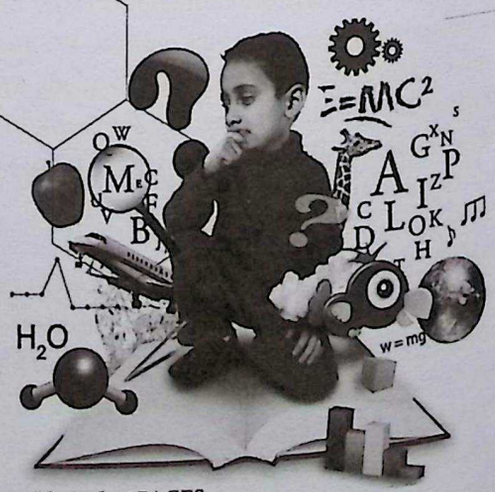

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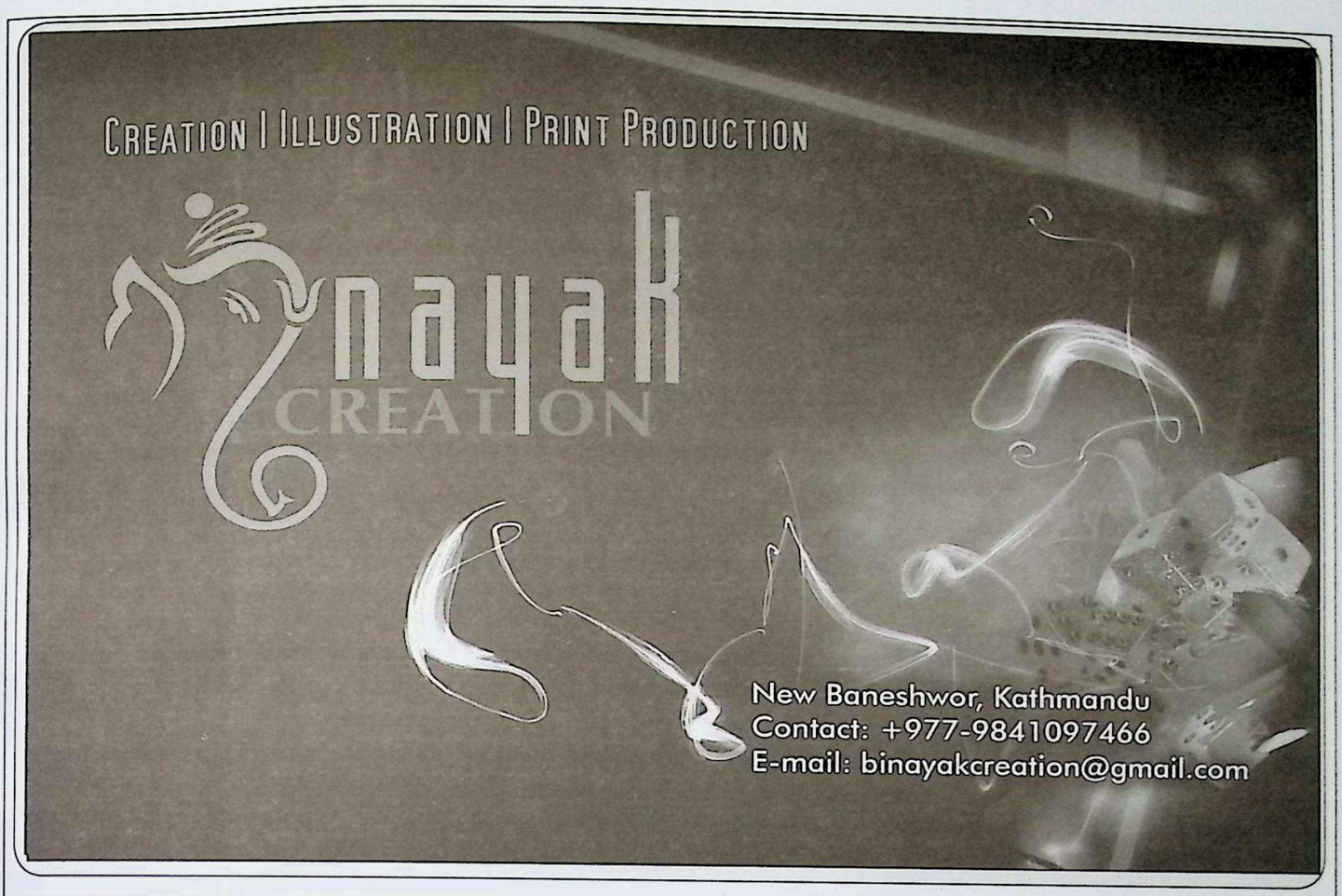

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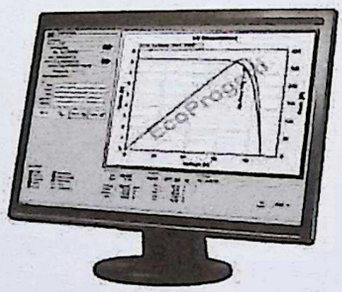

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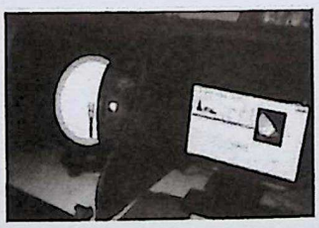
- LVD, LVR, HVD, HVR, Voltage Drop, Full Load



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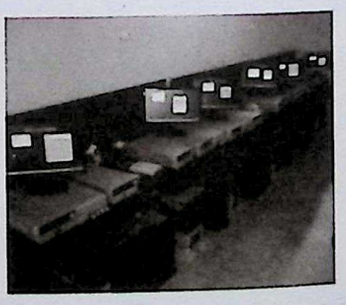
- View Angle, CRI, CCT
- Luminous Efficacy

d. Deep Cycle Battery Test
- Ah capacity
- Chatge Dischatge efficiency
- Battety Architecture



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- Self Consumption, LVD
- Frequency, THD, Output Voltage,
- Efficiency, Noise

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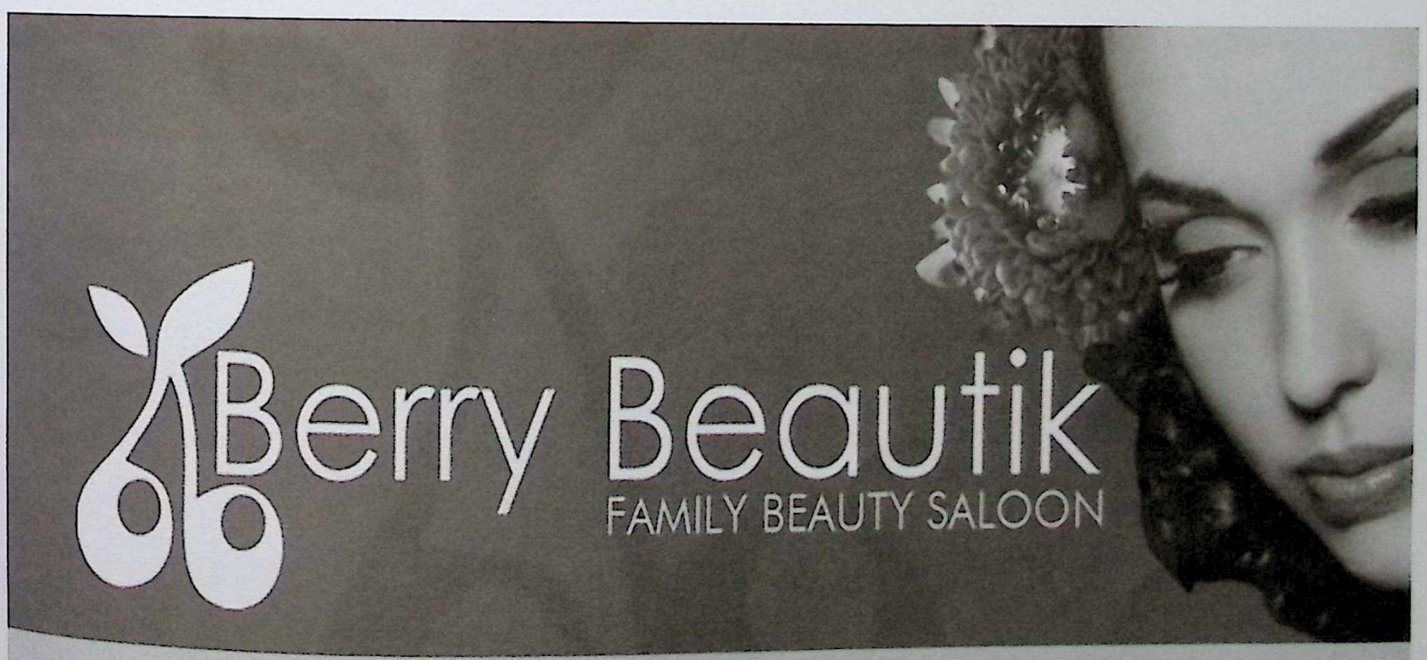

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Indian Council for Cultural Relations (ICCR)
भारतीय सांस्कृतिक संबंध परिषद् (भा.सां.सं.प.)

The Indian Council for Cultural Relations (ICCR) is an autonomous organization mandated to foster, revive, strengthen and promote cultural relations between India and other countries. It was established in year 1950 by India's first Minister of Education, Maulana Abul Kalam Azad.

ICCR is about a communion of cultures and a creative dialogue with other nations. To facilitate this interaction with world cultures, the Council has strived to articulate and demonstrate the diversity and richness of the cultures of India. The Council prides itself in being an eminent institution engaged in cultural diplomacy and one of the principal sponsors of intellectual & academic exchanges between India and partner countries.

ICCR's major activities involve promotion of culture and intellectual exchange between India and other countries. These include promotion of performing arts, visual arts, crafts, knowledge, education, literature, language, yoga, cuisine…both in their classical and contemporary forms and adopting all measures to promote the cultural relations. Headquartered in New Delhi, through its 37 Culture Centres abroad and 20 Regional Offices within the country ICCR functions as an interface between the countries abroad and various parts of the country. Through 5000 plus scholarships disbursed per annum to the foreign students and with around 100 Indian chairs in various universities all over the world, ICCR is actively involved in knowledge and education exchange. With the help of empaneled experts, artists and scholars in the fields of arts, yoga, language, education, literature the organization is involved in promotion and exchange of culture. ICCR is an important partner in the Cultural Exchange Programmes with countries abroad being collectively executed by the Government of India Ministries of External Affairs, Culture, Ayush, Overseas Affairs, Tourism and Human Resource Development.

भारतीय सांस्कृतिक संबंध परिषद् (भा.सां.सं.प.) की स्थापना स्वतंत्र भारत के प्रथम शिक्षामंत्री मौलाना अबुल कलाम आज़ाद द्वारा ९ अप्रैल १९५० में की गई थी। परिषद् का उद्देश्य भारत के विदेशी सांस्कृतिक संबंधों से संबंधित नीतियां और कार्यक्रम तैयार करना और उनके कार्यान्वयन में भागीदारी करनास भारत और अन्य देशों के बीच सांस्कृतिक संबंधों और पारस्परिक समझ को बढ़ाना और मजबूत करनास अन्य देशों और लोगों के साथ सांस्कृतिक आदान-प्रदान को बढ़ावा देनास संस्कृति के क्षेत्रों में राष्ट्रीय और अंतर्राष्ट्रीय संगठनों से संबंध स्थापित करना और उन्हें विकसित करनास और ऐसे कदम उठाना है जो इन उद्देश्यों को आगे बढ़ाने के लिए आवश्यक हों।

भा.सां.सं.प. का संबंध संस्कृतियों के समन्वय व अन्य देशों के साथ रचनात्मक संवाद से है। विश्व की संस्कृतियों के साथ इस पारस्परिक विचा-विमर्श को सुगम बनाने के लिए परिषद् देश में और विश्व के अन्य देशों के साथ भारत की संस्कृतियों की विविधता और समृद्धि को व्यक्त और प्रदर्शित करने का प्रयास करती है। परिषद् सांस्कृतिक कूटनीति में लगे रहने और भारत एवं अन्य सहभागी देशों के बीच बौद्धिक आदान-प्रदान को प्रायोजित करने वाली पूर्व-प्रतिष्ठित संस्था होने पर स्वयं को गौरवान्वित महसूस करती है। परिषद् का यह संकल्प है कि आने वाले वर्षों में भारत की महान सांस्कृतिक और शैक्षिक प्रफुल्लता के प्रतीक को बनाए रखे।

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SRI CHAITANYA SARASWAT INSTITUTE

The ontological role of the conscious scientist in the scientific enterprise is a topic that is rarely, if ever addressed in many of the theoretical fields of science. Yet this is the most glaring failure that science suffers and is leading to its contemporary crises. Sri Chaitanya Saraswat Institute raises awareness of this subject and presents some of the ways cutting-edge scientists are dealing with this problem in various fields of scientific research. Cognitive science and philosophy have made many advances over the past few decades, of which few scientists may have studied or may be aware. The scientific endeavor requires thinking which is in itself a subjective act. Yet there is no concept in conventional science that explains the subject. Twentieth century quantum mechanics brought back the subjective paradigm within the scientific compass and today in biology, the concept of a sentient-organic-system is redefining all our concepts in that field. This is bringing in a sea change in the western world and leading institutions like Harvard, Cambridge, MIT, and so on, are taking the study of cognition and its role in biology in earnest.

India is an ancient land which has produced very deep thought in the area of consciousness, causality, epistemology and its relevance in practical applications. Therefore India is poised to contribute in all areas of science because of its rich background of Vedanta and its ready embrace of world philosophies according to their relevant merit. Sri Chaitanya Saraswat Institute covers fields like cognition from plant sciences, cellular biology, developmental biology, mind-body problem, quantum mechanics, bioinformatics, evolution, laws of biological form, systems biology, origin of life, man-machine problem, consciousness and big bang, 'objectivity and subjectivity of evolution', 'science of spiritual biology, 'soul hypothesis' and 'Science of God'. The Institute considers that scientists and students from all branches of engineering and sciences will find our work very useful because we are discussing from premier research journals and presenting their conclusions and also giving some research ideas, which can potentially motivate interested research scholars.

The main vision for the institute has been given by Sripad Bhakti Madhava Puri Maharaja, PhD, who is also the founder of the Institute. Our leading servitor members are Ph.D. graduates of IIT Kharagpur, with expertise in their respective fields of scientific knowledge as well as rigorous training in the spiritual disciplines of consciousness studies. The Institute activities include organizing conferences, university outreach, training scientists and scholars from research institutes and other educational societies. It publishes literature and organizes outreach in various forms. We focus on the harmony between Science and Religion for establishing dedication towards the Supreme Absolute Lord Sri Krishna and inculcate the sense of universal brotherhood, co-operation, mutual harmony, unity, love and affection in the universe amongst the general public irrespective cast, color or creed.

Useful Links on Institute Services:

(1) The Harmonizer: www.scienceandscientist.org/harmonizer
(2) Darwin Under Siege: www.scienceandscientist.org/Darwin
(3) University Outreach: www.scienceandscientist.org/videos
(4) Mailing Lists: www.scienceandscientist.org/lists
(5) Online Classes: www.mahaprabhu.net/OnlineClass
(6) Science and Scientist: www.scienceandscientist.org
(7) Vedanta and Hegelian Philosophy: www.gwfhegel.org
(8) Sadhu-Sanga MP3s: www.mahaprabhu.net/satsanga

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